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Diversity in a Grassland: Flora of the Salero Ranch, Santa Cruz County, Arizona

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CANOTIA

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Canotia publishes botanical and mycological papers related to Arizona. These may include contributions to the Vascular Plants of Arizona project, checklists, local floras, new records for Arizona and ecological studies. All manuscripts are peer-reviewed by specialists. Acceptance for publication will be at the discretion of the editor. At least 30 printed copies of each issue are distributed to libraries in the United States, Europe, and Latin America. Anyone may download copies free of charge at http://www.canotia.org.

Canotia is named for *Canotia holacantha* Torr. (Celastraceae), a spiny shrub or small tree nearly endemic to Arizona. Cover photo by Susan D. Carnahan.

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INDEX TO FAMILIES OF THE VASCULAR PLANTS OF ARIZONA

Published treatments (**in bold**) can be found in volumes 26, 27, 29, 30, 32, 33, and 35 of the *Journal of the Arizona-Nevada Academy of Science* (**JANAS**) or in subsequent volumes (1–15) of **CANOTIA**. Unbolded entries indicate families with no treatments published to date. Figure numbers refer to illustrations in the "Key to Families of Vascular Plants in Arizona" in **JANAS** 35(2). All Vascular Plants of Arizona treatments are available as pdf files online at (http://www.canotia.org/vpa_project.html).

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DIVERSITY IN A GRASSLAND:
FLORA OF THE SALERO RANCH, SANTA CRUZ COUNTY, ARIZONA

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ABSTRACT: A vascular flora and annotated checklist are provided for the Salero Ranch, some 6500 hectares of private land in central Santa Cruz County, Arizona. The study area has a history of silver mining and cattle grazing dating back hundreds of years. It is located in the Madrean Sky Islands region near the U.S.–Mexico border and includes parts of the Grosvenor Hills and the foothills of the Santa Rita Mountains. The elevation varies from 1150 to 1934 m, a range of 784 m, and the terrain is rocky, sloped, fractured, and faulted, creating many microhabitats. Scrub or semidesert grassland is the dominant vegetation type; evergreen oak woodland (encinal) is also present. This flora is specimen-based; more than 1640 collections were made between 2013 and 2019 to document 788 species and infraspecific taxa distributed in 445 genera and 103 families. The largest families are Asteraceae (129 taxa at or below the specific level), Poaceae (115), Fabaceae (72), Euphorbiaceae (27), and Malvaceae (27). The largest genera are *Muhlenbergia, Euphorbia, Cyperus, Bouteloua,* and *Dalea.* Non-native plants (69) comprise 8.8% of the flora; nearly half (34) of the non-natives are grasses. Significant records include two species new to the United States (*Polystemma* sp., Apocynaceae; *Solanum houstonii*, Solanaceae), two species new to Arizona (*Ipomoea muricata,* Convolvulaceae; *Sida glabra,* Malvaceae), and new localities for several species with limited distributions in the state. Factors contributing to the floristic diversity are elevational range, topographic complexity, species-rich vegetative communities, and sampling effort. The results of this flora suggest that the grasslands of southeast Arizona—even private ones with a history of intensive use—harbor botanical surprises and high species numbers.

INTRODUCTION

This flora began as part of the Plant Atlas Project of Arizona (PAPAZ), a partnership of the Arizona Native Plant Society, Grand Canyon Trust, Desert Botanical Garden, Northern Arizona University, Museum of Northern Arizona, and the U.S. Forest Service to document the flora of under-studied parts of the state. I chose the site because it was my home territory and had not been previously inventoried. All photographs are mine unless credited otherwise.

The Salero Ranch is located in the center of Santa Cruz County, the smallest county in Arizona but arguably a botanical hotspot near the international border between the United States and Mexico. More than half (52.7%) of the county lies within Coronado National Forest (de Steiguer et al. 2005), including part or all of the Pajarito, Atascosa, Tumacacori, Santa Rita, and Patagonia mountains (Figure 1). This is the Sky Islands region (Gehlbach 1993; McLaughlin 1995; Van Devender et al. 2013), an archipelago of isolated, rugged mountain ranges separated by open grassland or desert in parts of Arizona, New Mexico, and the Mexican states of Sonora and Chihuahua. Geologist Raphael Pumpelly used the phrase "islands from the sea" to describe these mountain ranges in the 1860s:

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> *The region is crossed by parallel granite ridges, running generally north or northwest, and rarely more than sixty miles long and ten to thirty miles apart. The intervals between the mountains are occupied by plains rising gently from the centre to the ridges on either side, and extending around the ends of these. Thus the whole country is a great plain, out of which rise the many outlying sierras of the Rocky range, as islands from the sea.* (Pumpelly 1965/1870: 26)

Southern Arizona's sky islands have long attracted botanical collectors. Most of these ranges have grassland at their margins, but these regional grasslands have been less assiduously inventoried for their own sake, with the exception of floras by McLaughlin (1992, 2006) on public land and by McLaughlin et al. (2001) and Roll (2018) on private land. The present study adds to our understanding of southeast Arizona flora by documenting the diversity of some 6500 ha (16,000 ac) of grassland and woodland that was impacted by silver mining beginning in the late 17th century and by cattle grazing since at least the 19th century (Bahre 1995; Sheridan 2006).

STUDY AREA

The study area is a fenced, private cattle ranch and rural subdivision. Its center lies 63 km (38 mi) south of Tucson and 25 km (15 mi) north of the U.S.–Mexico border. Comprising 6541 ha (16,163 ac), the study area extends 10.3 km (6.4 mi) north to south, between latitudes 31.612°N and 31.519°N, and roughly 9.2 km (5.7 mi) west to east, between longitudes 110.937°W and 110.840°W. It is bordered to the north by Arizona State Trust Land and Coronado National Forest (CNF), to the east by CNF and private land, to the south by Sonoita Creek State Natural Area and private land, and to the west by private land. Camino Josefina, the main access road to the ranch, runs from the Santa Cruz River Valley to the west (main) Salero gate. Forest Service Road 143 (Salero Canyon Road) cuts diagonally through the northeast corner of the ranch and connects Mount Hopkins Road near Amado with Arizona Highway 82 near Patagonia.

The topography of the study area is highly dissected, with rocky slopes, boulder outcrops, cliffs, and local drainages providing many microhabitats. The elevation ranges from 1150 m (3773 ft) in upper Fresno Canyon near the southwestern corner of the ranch to 1934 m (6344 ft) in the Santa Rita foothills in the northeast corner, a difference of 784 m (2571 ft). The Grosvenor Hills dominate the center of the study area and reach a high point of 1645 m (5397 ft). Water sources include natural springs, cattle ponds, and seasonal drainages, including parts of Alamo Canyon, Alto Gulch, Ash Canyon, Bond Canyon, Cieneguita Canyon, Fresno Canyon, Hangmans Canyon, and Josephine Canyon. Tejano Spring, at the base of a south-facing rock face in the Grosvenor Hills, is the study area's most robust natural spring and features a sloping, wet meadow with small, ciénaga-like pools and an artesian well.

GEOLOGY (Assisted by Richard Conway)

The landscapes of the Salero Ranch area trace their origins to the Late Triassic and Early Jurassic, during which time the region was the site of abundant igneous activity. The rocks in the study area include deep intrusive rocks (granite, diorite, monzonite), shallow intrusive rocks (rhyolite, rhyodacite), and volcanic rocks, including lava flows, volcanic breccia, and welded and unwelded tuff. Closely associated with these strictly volcanic rocks are sedimentary (often called volcaniclastic) rocks dominated by volcanic material. These

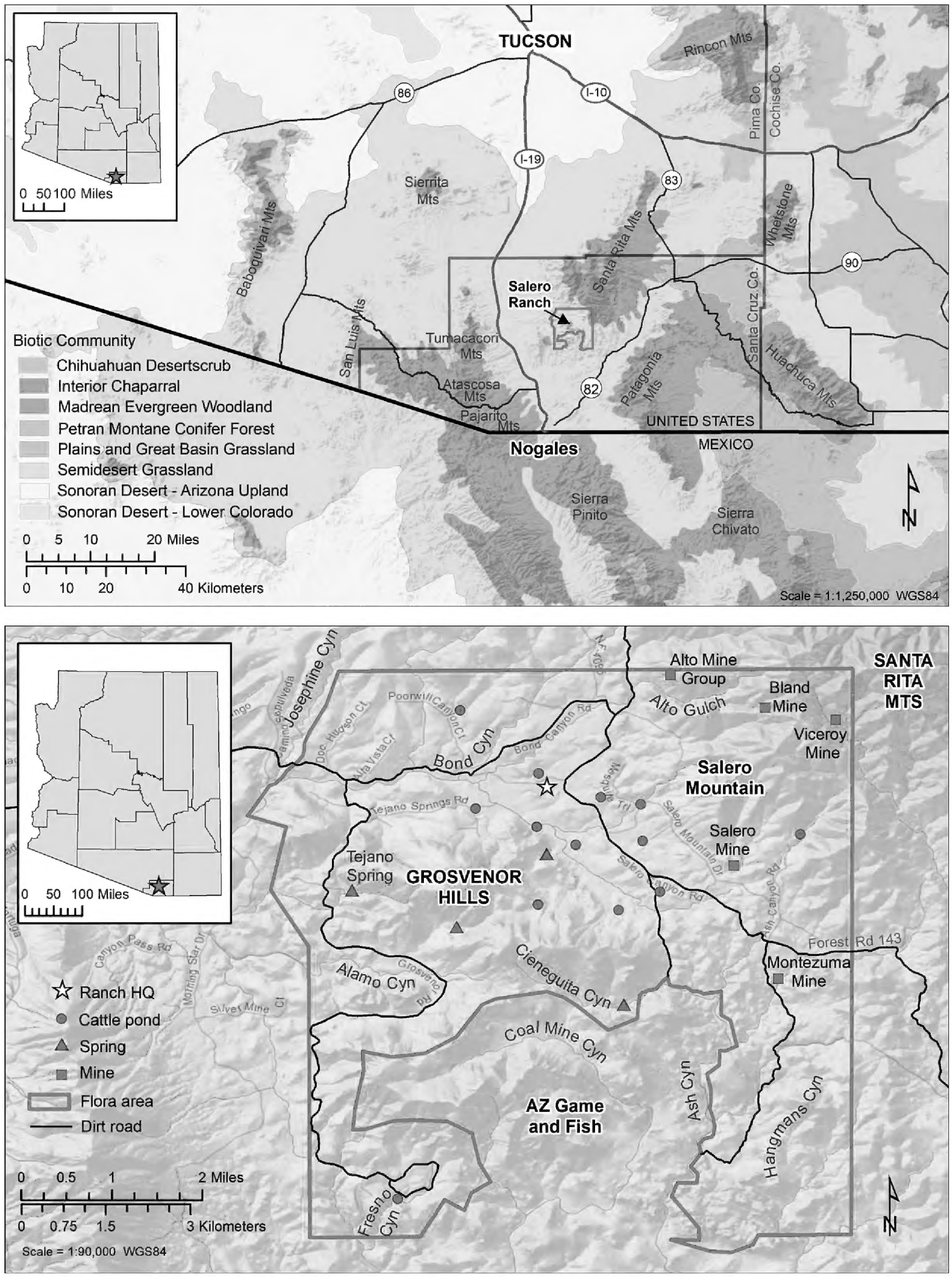

Figure 1. (Top) Location of study area in Sky Island region of southern Arizona, with overlay of biotic communities from Brown and Lowe (1980). (Bottom) The study area, including major roads, canyons, cattle ponds, springs, and mines. Maps by Susan Rutman.

Figure 2. View of Salero Ranch and Grosvenor Hills from northeast corner of ranch, July 2015; photo by Curtis Smith.

include sedimentary breccia, conglomerate, and sandstone. Other sedimentary rocks contain sediments washed out of nearby highlands. Faulting, fracturing, and weathering have all played their part in the development of the present-day landscape. The primary sources for this geologic description are the publications of Harald Drewes, who mapped and described the geology of the Santa Rita Mountains, including the Grosvenor Hills, in the 1960s and 1970s.

Other than a few small isolated outcrops of Piper Gulch Quartz Monzonite from the Late Triassic, the oldest rocks in the study area are Squaw Gulch Granite, dating to 145–160 million years ago (Drewes 1968, 1976). This salmon-colored, coarse-grained rock occurs in the northeastern part of the study area and is also visible as isolated outcrops in the northwest (Drewes 1971). Overlying the Squaw Gulch Granite is the Salero Formation, which originated 72 million years ago in the Late Cretaceous (Drewes 1968). This formation includes dacite lava flows, welded and unwelded tuff, tuff sandstones, volcanic and sedimentary breccia, conglomerate, and arkose (a sandstone containing abundant feldspar and quartz grains).

The Santa Rita foothills in the northeast corner of the ranch are underlain by 65-million-year-old Josephine Canyon Diorite, which intrudes the Squaw Gulch Granite (Drewes 1971; Drewes 1976). A swarm of large quartz veins, some measuring 1.5 m (5 ft) wide and 610 m (2000 ft) long, occurs here as well. The veins were emplaced during faulting in the Eocene (56-34 million years ago) and are associated with concentrations of copper, lead, silver, and zinc (Drewes 1972a, 1973); this mineralization brought Spanish prospectors to the area as early as the end of the 17th century (Schrader & Hill 1915).

In the southwestern part of the study area, the Grosvenor Hills Volcanics are exposed (Drewes 1968). They formed during the Oligocene, about 25 million years ago, when a large volcano erupted near the present-day San Cayetano Mountains southwest of the study area. The oldest rocks in the Grosvenor Hills Volcanics are gravels, siltstones, and shales. They are overlain by 150 m (500 ft) of rhyolite tuff and tuff breccia, appearing as fine-grained layers of

orange, pink, red, and brown. Capping the rhyolite layers are another 245 m (800 ft) of rhyodacite agglomerates and lava flows, along with welded and unwelded tuff (Drewes 1972a).

Dominating the center of the study area are the Grosvenor Hills, an area of high relief shaped by a series of laccoliths, which are intrusions of rhyodacite magma fed by a series of dikes into the overlying Grosvenor Hills Volcanics. The laccoliths are up to 275 m (900 ft) thick and 2.4 km (1.5 mi) long, with an unusual bulbous shape, like a conventional doorknob (Drewes 1972a). The north end of the Grosvenor Hills features vertical cliffs with grassland-covered talus slopes below (Figure 3).

The complex topography of the Salero Ranch is due in large part to widespread faulting and fracturing. Much of the study area is a graben, or down-dropped fault block. Its western boundary is the San Cayetano Fault, a regional fault with a displacement of as much as 760 m (2500 ft) (Drewes 1972b). Within the Salero graben, block displacements of 150 m (500 ft) also occurred; still other, smaller displacements created a complex matrix of blocks, deforming the volcanic layers throughout the study area. Rocks were fractured during cooling and faulting as well as during regional tectonic episodes, such as the extensional stretching 35 to 10 million years ago that formed the Basin and Range Province and the Sky Islands region (Drewes 1972b; Scarborough 2000).

Millions of years of volcanism, complex faulting and fracturing, and differential weathering combined to create the present-day topography of the Salero Ranch: a landscape of cliffs, rocky slopes, outcrops, and localized drainages with a variety of exposures. Fractures in the rock layers allow rainfall to penetrate and recharge the underground aquifers; they also allow groundwater to reach the surface in the form of perennial springs and artesian wells. The elevational changes, the wealth of microhabitats, and the presence of perennial water are important contributing factors to the floristic diversity and richness of the study area (Bowers & McLaughlin 1982; Bennett & Kunzmann 1992).

CLIMATE

The climate of southeast Arizona is semiarid, with a bimodal (winter–spring and summer–fall) pattern of precipitation that produces two corresponding growth and flowering seasons. Climate data for the study area were obtained from nearby National Weather Service COOP stations (data collection stations operated by volunteers; see https://www.weather.gov/coop/overview): precipitation data were recorded in Patagonia (Station 026282), 8 km (5 mi) east of the ranch boundary; temperature data were recorded at Nogales (Station 025924), 9.7 km (6 mi) to the southwest.

Annual rainfall from 1978 to 2013 averaged 457 mm (18 in), more than half of which (54%) is in the form of convective thunderstorms during the monsoon season of July, August, and September. These thunderstorm events can be intense but spatially focal, such that one patch of ground receives significant rainfall while adjacent areas remain dry. Winter precipitation, mostly from Pacific frontal systems, averaged 102 mm (4 in) from December through February; annual snowfall averaged 36 mm (1.4 in). In contrast to monsoon rains, winter precipitation is usually gentle and widespread but unreliable from one year to the next. The driest months are April, May, and June.

The average high temperature at the Nogales COOP station from 1952 to 2012 during the summer months of June, July, and August was 34.3°C (93.8°F); the average summer low was 15.8°C (60.5°F). The average winter low during December, January, and February was -2.1°C (28.2°F); the average winter high was 18.4°C (65.2°F).

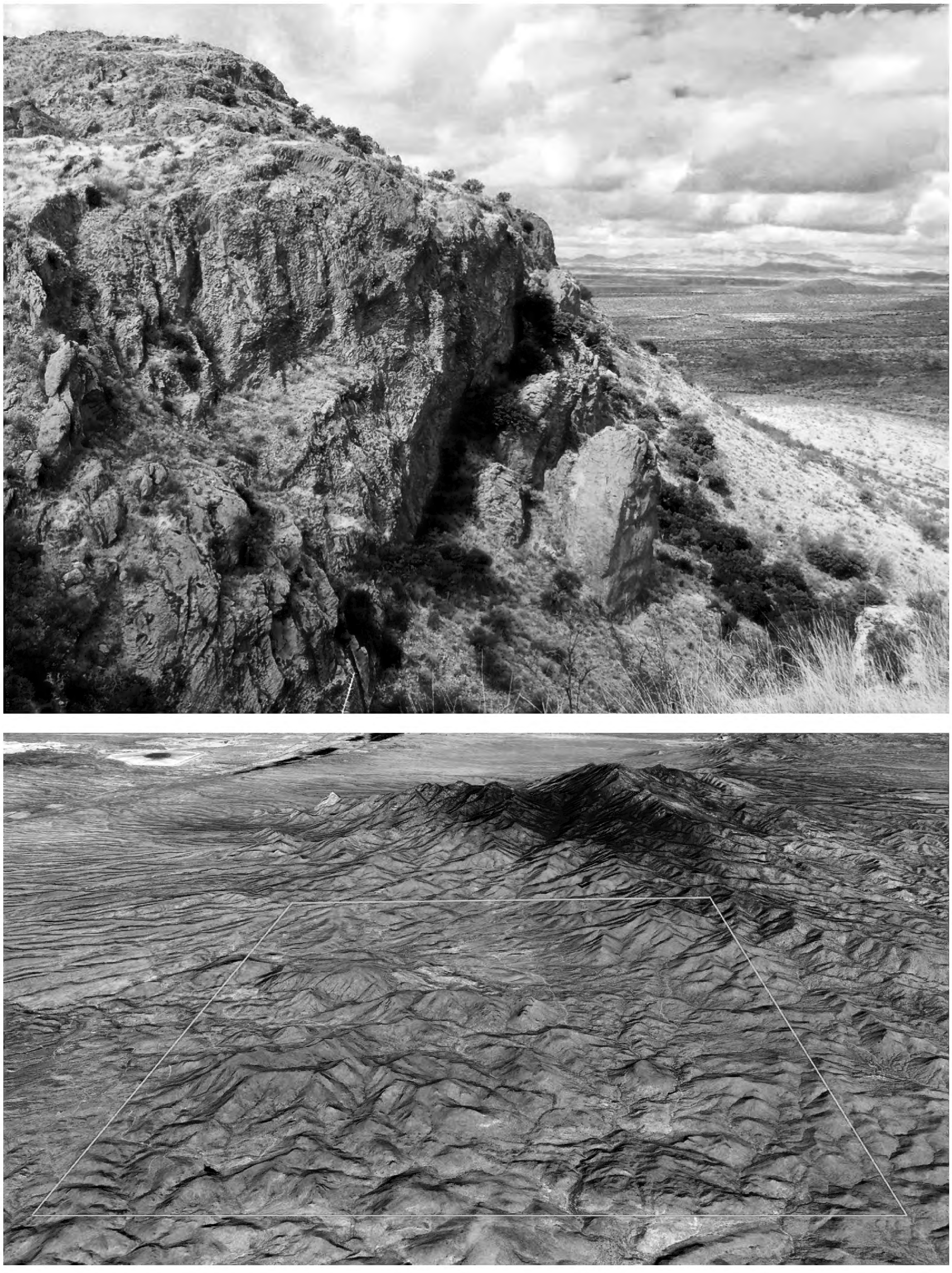

Figure 3. (Top) Northeast corner of Grosvenor Hills; the shaded cliff at center is an exposed edge of the laccolith, February 2014. (Bottom) Oblique view of study area terrain (approximately within yellow trapezoid), looking north toward the Santa Rita Mountains; map data from Google Earth.

Figure 4. Snowfall on scrub grassland, January 2007.

LAND USE HISTORY

The Salero Ranch and surrounding lands have a layered history of human use. Artifacts from the Late Archaic (2000 BC) as well as the Hohokam periods (1–1400 AD) have been documented at Coal Mine Spring (Moss 2010), originally part of the Salero Ranch and now owned by Arizona Game and Fish Department. Prior to the Spanish Conquest, the Santa Cruz River Valley west of the study area was inhabited by the Akimel O'odham, agriculturalists who grew crops, including tepary beans, maize, squash, and amaranth in the rich riverine soils (Sheridan 2006).

After Spain laid claim to the region, Jesuit missionaries built a chain of missions in a part of modern-day northern Sonora and southern Arizona. In 1691, Father Eusebio Francisco Kino established the Guevavi and Tumacácori missions along the Santa Cruz River, and in 1697 he introduced livestock to the region, including cattle, sheep, and goats. The Spanish, meanwhile, were prospecting for precious metals in the foothills of the Santa Rita Mountains, establishing the Salero Mine and Alto Mine Group possibly as early as 1687 (Schrader & Hill 1915). Silver was the principal target, but lead, zinc, copper, and gold were also extracted.

Throughout the 18th and 19th centuries, Western and Chiricahua Apaches were pushing southward into the region. Their raiding activities made life at the missions and mining camps difficult and dangerous, and settlements were often abandoned for years at a time. Before the mid-19th century, cattle grazing was concentrated along the riparian corridors, and its impact on regional grasslands was likely minimal (Bahre 1995).

Following the Gadsden Purchase in 1853, this part of the Southwest became New Mexico Territory; American and European investors, surveyors, and engineers soon arrived to seek their fortunes in precious metals. Among them were William Wrightson, Gilbert Hopkins, Horace Grosvenor, and Raphael Pumpelly, four principals of the Santa Rita Mining Company that was headquartered at the Hacienda de Santa Rita, at the base of the Grosvenor Hills on present-day Salero Ranch.

Pumpelly, a raconteur as well as a metallurgist and geologist, wrote a detailed description of the Salero landscape and vegetation in the 1860s:

> *The hacienda* [de Santa Rita] *which was to be my home, lay in a broad and picturesque valley, shut in on the north by the lofty range of the Santa Rita mountains, and on the south by high and castellated cliffs of dark porphyries and white tufa. Through the open valley, toward the west, towering over fifty miles of intervening country, the horn-like peak of the Baboquiveri mountain was always visible, its outline sharply cut on the clear sky. The Santa Rita valley consists mainly of mesa-land, rising like islands from the plain, or by the round-backed spurs from the mountains. The surface of these spur-hills is roughened by a net-work of innumerable mineral veins.*
>
> *The drainage from the mountains passes through the valley in a deeply-cut cañon, containing here and there a little water, while throughout the rest of the valley, with the exception of two or three springs, water can be had only by digging. A few cottonwoods occur along the water-courses, and a good growth of mesquit trees and acacias covers the bottom-land. The mesa is the home of a great variety of cacti, the yucca, and the fouquiera, a shrub sending up from the root a large number of simple stems, covered with sharp thorns, and in the season bearing beautiful flowers. Scattered live-oaks twenty to thirty feet high are peculiar to the spur hills. As we approach the summits of the higher hills the live-oaks give place to small cedars, while on the Santa Rita mountains, at an elevation of about six thousand feet, begins an invaluable but limited growth of fine pine timber.*
>
> *The whole valley and its enclosing hills are covered with abundant grass of several kinds, which, while of great importance to the country, give to this a parched appearance. It is in reality a crop of hay, never being green except where burnt off before the rainy season. The peculiar effect of this vegetation is heightened by the abundance of the short columnar fish-hook cactus, the yucca, the broad thorn-pointed leaves of the Spanish bayonet, and the tall, lance-like stem of the century plant, bearing its gracefully-pendant flowers.* (Pumpelly 1965/1870: 35–36)

Throughout the 1860s, there were many skirmishes between Chiricahua Apaches and the American and European newcomers—soldiers as well as miners. Grosvenor was killed by Apaches in 1861; the killings of Wrightson and Hopkins in 1865 launched the Battle of Fort Buchanan in nearby Sonoita (conspicuous as the only American fort to be defeated by the Chiricahua Apaches). The names of all three men were given to nearby peaks and landforms: Mount Wrightson and Mount Hopkins in the Santa Rita Mountains, and the Grosvenor Hills on what would become Salero Ranch.

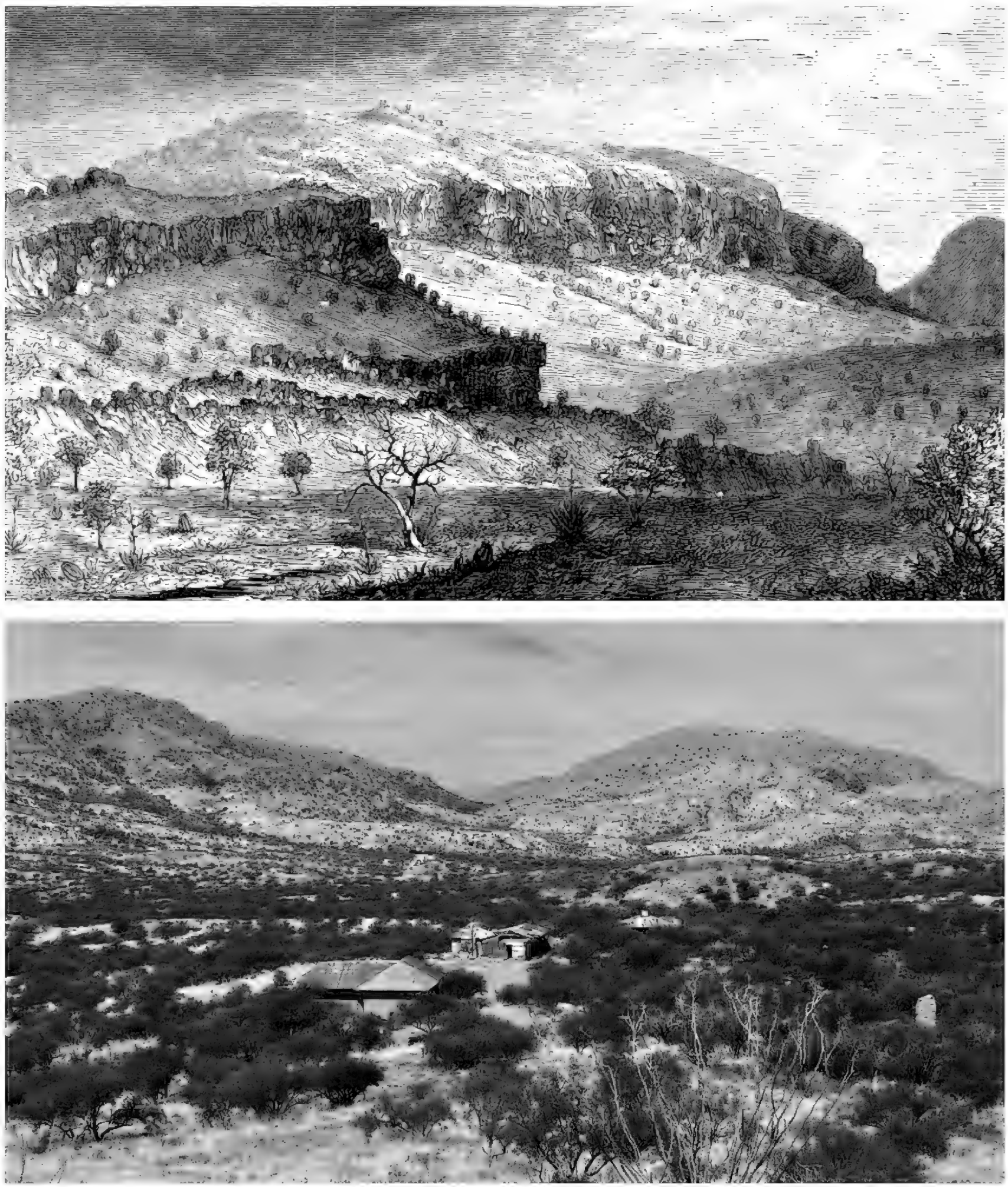

Figure 5. (Top) Line engraving of Grosvenor Hills from the 1860s, titled "The Santa Rita Valley" and attributed by Raphael Pumpelly as "from a sketch by H. C. Grosvenor" (Pumpelly 1965/1870: 39), perhaps finished by Pumpelly. (Bottom) Salero Camp (ghost town) at Salero Mine, looking southwest to Grosvenor Hills, May 2019.

The Salero Mine and Alto Mine Group were actively worked during this period. A letter dated July 15 (no year) from George Allison, who ran a store in the 1870s at Salero Camp near the Salero Mine, gives a sense of the time: "We have a store, keep some boarders and sell some meat….We still have some mines that we think are good and shall hold them….I have a garden but it will be late…no rain til 9th of this month but it has rained very heavy since" (Allison 1870s). A post office was reportedly opened at Salero in 1884; in 1909, the community

numbered at least 20 men (Schrader & Hill 1915). Several adobe buildings still stand at Salero Camp in various stages of decay. Exotic plantings likely dating to this period include a European olive (*Olea europea*) and four small pomegranate shrubs (*Punica granatum*). The nearby Alto Mine, comprising a group of 21 claims, supported a community of several hundred persons at its height. Mining continued sporadically at these claims and as many as ten other mines within the study area into the 1920s and perhaps later (Sheridan 2006), although work was frequently interrupted by Apache raids.

In the meantime, private ownership of what would become the Salero Ranch had its start in the mid-1800s with the Baca Float No. 3 Grant. Luis María Cabeza de Baca, a Mexican sheep rancher in New Mexico Territory who had lost claim to 200,000 ha (approx. 500,000 ac) near the Pecos River, filed a grievance with the U.S. Congress and was granted compensatory acreage in the form of five square, 40,470-ha (100,000-ac) parcels of "vacant land, not mineral" (cited in Sheridan 2006: 144). Baca Float No. 3 near the Santa Cruz River was one such parcel, which were called "floats" because their legal boundaries were not initially determined.

Identifying a square tract of 40,470 ha between the Santa Cruz River and the Santa Rita Mountains that was both vacant and non-mineral in 1860 was impossible: the river valley had been inhabited for generations and the Santa Ritas were pockmarked with silver mines. The ultimate location of the Baca Float No. 3 would be litigated for the next half-century, during which time many pieces of it were sold and traded, often unscrupulously. A cowboy named Joseph Wise moved into the abandoned Hacienda de Santa Rita in 1884 and by 1907 was reportedly fencing and running cattle on 10,000 ha (approx. 25,000 ac) he claimed to have bought (Sheridan 2006). USGS maps from 1904 and 1914 bear the name "Wise's Ranch" where the current Salero Ranch headquarters stands. When the U.S. Supreme Court ruled in 1914 (Lane v. Watts) on the Baca Float No. 3's final boundaries and legal owners, Joseph Wise was not mentioned. The final position of the float extended from the west side of the Santa Cruz River eastward into the Santa Rita foothills.

Between 1929 and 1934, Texas oilman and rancher Talbot "Tal" Pendleton bought up most of Baca Float No. 3 and stocked it with Santa Gertrudis cattle from Texas. In 1938, he sold 10,765 ha (26,602 ac) in the northeast corner of the float to Roy and Helen Adams (Sheridan 2006). This was the Salero Ranch. Two years later, Texas cattleman Wirt "Dink" Parker bought the ranch, and in 1972 his heirs sold it to Dwight "Doc" Hudson. Finding the Salero overgrazed by Parker's 1500 steers and covered in snakeweed (*Gutierrezia microcephala*), Doc reduced the cattle numbers and began a cow-calf operation with 350 cows. He tried to combat woody shrub encroachment by various means, including a brush cutter and herbicide pellets (probably Tebuthiuron), although the latter effort was discontinued due to cost. In the 1980s, Hudson had the entire ranch aerially seeded with a mix of sideoats grama (*Bouteloua curtipendula*), Lehmann lovegrass (*Eragrostis lehmanniana*), filaree (*Erodium cicutarium*), and woolly plantain (*Plantago patagonica*) (John Hudson, pers. comm., May 2018).

In 1987, 2000 ha (approx. 5000 ac) in the southwest corner of Salero were sold to the developers of Morning Star Ranch, a rural subdivision. Beginning in 1998, the Hudson family (incorporated as Salero Land and Cattle, Inc.) began platting most of the remaining Salero lands into 14.5-ha (36-ac) rural residential parcels. They kept 1940 ha (4800 ac) for the ranch headquarters, springs and cattle ponds, and unbuildable high country; they also retained grazing rights on any unfenced subdivision parcels. Between 2004 and 2007, the Coal Mine Canyon and lower Ash Canyon watersheds (1744 ha, 4309 ac) in the south-central part of the

ranch were purchased by the Arizona Game and Fish Department to preserve a native population of endangered Gila topminnows (Trust for Public Land 2006). This acreage is managed by Arizona State Parks and is not part of this study (see Figure 1).

At present, the Salero is a working cattle ranch and rural residential development comprising 6,541 ha (16,163 ac). There are 271 14.5-ha subdivision parcels, 50 km (31 mi) of dirt roads, and 20 homes. Salero Land and Cattle runs a cow-calf operation with about 200 cows and a few bulls; the cattle are moved seasonally between pastures.

VEGETATIVE COMMUNITIES

The dominant vegetative community is scrub grassland, also called semidesert grassland (Brown 1982). In the Santa Rita foothills in the northeast part of the study area, and on localized north-facing slopes, grassland transitions to evergreen oak woodland or *encinal* (from the Spanish *encino,* meaning oak; Shreve 1915), also called Madrean evergreen woodland (Brown 1982).

Scrub grassland. Scrub grassland features a mix of perennial grasses, herbaceous plants, and shrubs, with few tree species except along watercourses. Characteristic grasses include three-awn spidergrass (*Aristida ternipes* var. *gentilis*), spidergrass (*A. ternipes* var. *ternipes*), cane beardgrass (*Bothriochloa barbinodis*), sprucetop grama (*Bouteloua chondrosioides*), sideoats grama (*B. curtipendula*), hairy grama (*B. hirsuta*), slender grama (*B. repens*), weeping lovegrass (*E. curvula*), Lehmann lovegrass (*Eragrostis lehmanniana*), tanglehead (*Heteropogon contortus*), curly mesquite (*Hilaria belangeri*), vine mesquite grass (*Hopia obtusa*), Rose natal grass (*Melinis repens*), Arizona muhly (*Muhlenbergia arizonica*), bullgrass (*M. emersleyi*), and giant sacaton (*Sporobolus wrightii*). Deergrass (*Muhlenbergia rigens*) is common to abundant along seasonal drainages; populations of long-tongue muhly (*M. longiligula*) often co-occur with it.

Velvet mesquite (*Prosopis velutina*) is a prominent member of the scrub grassland community; it is found throughout the study area, including sunny slopes in encinal. Other characteristic shrubs are oreganillo (*Aloysia wrightii*), Correll's snakewood (*Condalia correllii*), sotol (*Dasylirion wheeleri*), turpentine bush (*Ericameria laricifolia*), southwestern coralbean (*Erythrina flabelliformis*), kidneywood (*Eysenhardtia orthocarpa*), ocotillo (*Fouquieria splendens* subsp. *splendens*), catclaw mimosa (*Mimosa aculeaticarpa* var. *biuncifera*), velvetpod mimosa (*M. dysocarpa*), littleleaf mulberry (*Morus microphylla*), and graythorn (*Sarcomphalus obtusifolius*). Common succulents include shindagger (*Agave schottii* var. *schottii*), Palmer agave (*A. palmeri*), fishhook barrel cactus (*Ferocactus wislizeni*), Engelmann prickly pear (*Opuntia engelmannii* var. *engelmannii*), and Santa Rita prickly pear (*O. santarita*). Two small saguaros (*Carnegiea gigantea*) stand on south-facing slopes. In the south part of the ranch, milfoil wattle (*Mariosousa millefolia*) becomes common on rocky, south-facing slopes.

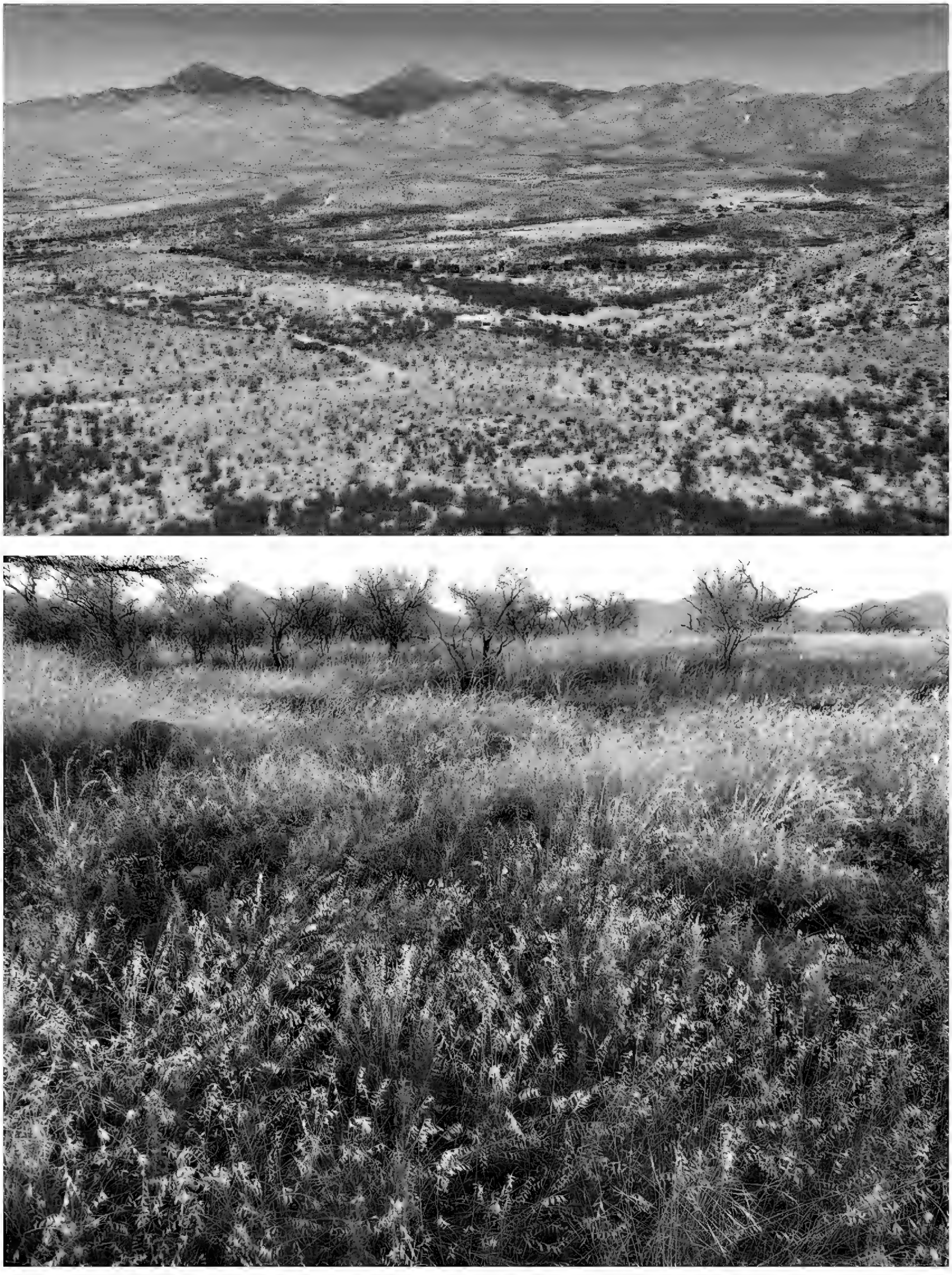

Figure 6. (Top) Scrub grassland with velvet mesquites (*Prosopis velutina*) in north part of study area, looking north to Santa Rita Mountains, April 2017. (Bottom) Scrub grassland with slender grama (*Bouteloua repens*) in foreground, sideoats grama (*B. curtipendula*) in background, September 2018.

Trees species such as netleaf hackberry (*Celtis reticulata*), velvet ash (*Fraxinus velutina*), Arizona walnut (*Juglans major*), Fremont cottonwood (*Populus fremontii* subsp. *fremontii*), and western soapberry (*Sapindus saponaria*) are mostly confined to drainages and the margins of large cattle ponds. Four willow species occur in the study area; Goodding willow (*Salix gooddingii*) is the most common, followed by coyote willow (*S. exigua*), yewleaf willow (*S. taxifolia*), and Bonpland willow (*S. bonplandiana*). Arizona juniper (*Juniperus arizonica*) is found in the south half of the study area. Goodding ash (*Fraxinus gooddingii*) is occasional on rocky slopes and along shallow drainages in the Grosvenor Hills. A few blue palo verdes (*Parkinsonia florida*) are found at the lower elevations near the southern and western margins of the ranch. A small population of desert willow (*Chilopsis linearis* var. *arcuata*) occurs in Hangmans Canyon in the southeast corner of the study area.

Encinal. Along narrow drainages, on localized north-facing slopes, and in the Grosvenor Hills and Santa Rita foothills, scrub grassland transitions to encinal or evergreen oak woodland. In the lower hills, alligator-bark juniper (*Juniperus deppeana*), Emory oak (*Quercus emoryi*), and Mexican blue oak (*Q. oblongifolia*) are common, along with velvet mesquite. Above about 1525 m (5,000 ft), Arizona oak (*Q. arizonica*) and border pinyon (*Pinus discolor*) appear, along with occasional pointleaf manzanita (*Arctostaphylos pungens*) and silverleaf oak (*Q. hypoleucoides*). The shrub assemblage in encinal includes Arizona spikenard (*Aralia humilis*), Wright's silktassel (*Garrya wrightii*), beargrass (*Nolina microcarpa*), evergreen sumac (*Rhus virens* var. *choriophylla*), and mountain yucca (*Yucca* cf. *schottii*). Pancake prickly pear (*Opuntia chlorotica*) essentially replaces Engelmann and Santa Rita prickly pears in the Santa Rita foothills. Characteristic grass species in encinal are Orcutt's three-awn (*Aristida schiedeana* var. *orcuttiana*), bullgrass (*Muhlenbergia emersleyi*), long-tongue muhly (*M. longiligula*), pinyon ricegrass (*Piptochaetium fimbriatum*), muttongrass (*Poa fendleriana*), crimson bluestem (*Schizachyrium sanguineum*), and bulb panicgrass (*Zuloagaea bulbosa*).

Viceroy Mine Canyon, a steep-sided, spring-fed drainage through encinal in the far northeast corner, is the only location for several species in this survey. These include ragleaf bahia (*Amauriopsis dissecta*), turban sedge (*Carex leucodonta*), Wright's sensitive pea (*Chamaecrista serpens* var. *wrightii*), Santa Rita Mountain tick-trefoil (*Desmodium retinens*), Bartram stonecrop (*Graptopetalum bartramii*), lemon beebalm (*Monarda citriodora subsp. austromontana*), Toumey oak (*Quercus toumeyi*), and sawtooth candyleaf (*Stevia serrata*).

Shrub encroachment in the grassland. Over the past 100 to 150 years, southeast Arizona grasslands have experienced steady encroachment by woody shrubs, including mesquites. Repeat photographs of the Salero Mine site in 1909 and 2016 (Figure 8) and the Alto Mine site in 1909 and 2018 (Figure 9) illustrate this encroachment. Debate continues over the primary cause of the shrub invasion, but multiple factors are likely at work, including shifts in grazing intensity, fire suppression, introduction of non-native grasses, and short- and long-term climate shifts (McClaran 1995, 2003). Raphael Pumpelly mentions fire in his 1860s description of the Salero grassland: "never being green except where burnt off before the rainy season" (Pumpelly 1965/1870: 36). Wildfires were a common occurrence in southeast Arizona grasslands during that period (Bahre 1995).

Figure 7. (Top) Encinal or Madrean evergreen woodland in northeast corner of study area, April 2012. (Bottom) Mexican blue oaks (*Quercus oblongifolia*) on north-facing slope (left) and velvet mesquites (*Prosopis velutina*) on south-facing slope (right) in lower Santa Rita foothills, April 2019.

Figure 8. (A) The Salero Mine in 1909, at base of Salero Mountain; photo courtesy of USGS. Trees in the distance are likely Mexican blue oaks (*Quercus oblongifolia*). Mesquites (*Prosopis velutina*) are few or absent. The grassland appears grazed. (B) The Salero Mine site in October 2016. Most of the shrubs and trees are velvet mesquites, with a few Mexican blue oaks in rock outcrops and on the higher slopes. The grassland appears grazed.

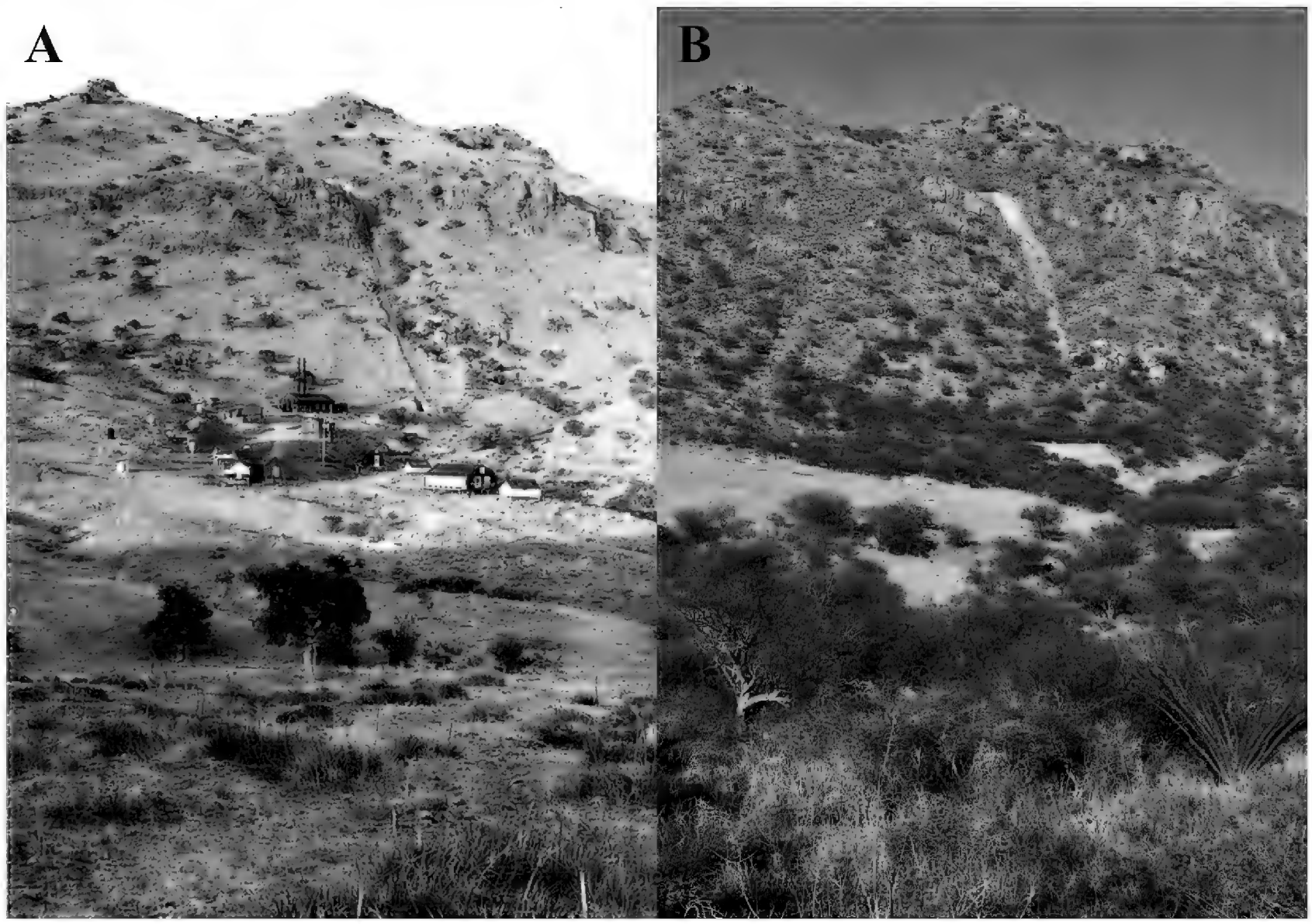

Figure 9. (A) The community of Alto below the Alto Mine in 1909; photo courtesy of USGS. The trees below the buildings and on the slope are probably Mexican blue oaks (*Quercus oblongifolia*); velvet mesquites (*Prosopis velutina*) are few or small. In the foreground are clumps of shindagger (*Agave schottii*) and grasses that appear closely grazed. (B) The Alto site in April 2018. Shrubs and trees in the foreground and middle ground are mostly velvet mesquites, with ocotillo (*Fouquieria splendens*) blooming at right. The distant rocky slope supports Mexican blue oaks from near the base to the summit as well as mesquites nearly to the ridgetop. The bunchgrasses in the foreground appear ungrazed.

METHODS

Permission to collect specimens was obtained from the owners of 223 (out of 271) residential parcels as well as from the Hudson family. In all, access was granted to 5,734 ha (14,168 ac), representing 88.7% of the study area and 100% of the vegetative communities. More than 360 collecting trips were made in all seasons from April 2013 through August 2019. Because I live in the study area, many of these trips were short in duration and targeted only a few taxa. More than 1640 vouchers were obtained. Photographic vouchers on the SEINet Portal Network (2019) were used for several plants that were physically inaccessible or are rare within the study area or region.

All specimens were deposited at the University of Arizona Herbarium (ARIZ) in Tucson unless otherwise noted by the standardized abbreviations for herbaria (Thiers 2019). Duplicates when available were shared with the following herbaria:

ASC: Deaver Herbarium, Northern Arizona University, Flagstaff
ASU: Arizona State University Vascular Plant Herbarium, Tempe
DES: Desert Botanical Garden Herbarium, Phoenix
MEXU: Herbario Nacional de México, Mexico D.F.
MO: Missouri Botanical Garden Herbarium, Saint Louis
OKLA: Oklahoma State University, Stillwater

SD: San Diego Natural History Museum Herbarium
TEX: University of Texas Herbarium, Austin
UC: University of California Herbarium, Berkeley
USON: Herbario de la Universidad de Sonora, Hermosillo

A search of SEINet was conducted to look for other collections within the ranch boundary. Four herbarium specimens were collected by Annita Harlan in April 2003 and deposited at ARIZ. Collections by Mark Fishbein, Kathleen Koopman, and Max Licher were made with me during the study period. These collections and my own are the only ones known from the study area.

The Missouri Botanical Garden Tropicos database (Tropicos 2019) is used for naming authorities. Nomenclature follows that of published treatments in *Flora of North America* (Flora of North America Editorial Committee, 1993+), except when such treatments have been superseded by more recent research. See, for example, Fuentes-Bazán et al. (2012) for *Blitum nuttallianum* (Amaranthaceae), Fishbein and Gandhi (2018) for *Funastrum heterophyllum* (Apocynaceae), and Schilling and Panero (2011) for *Aldama cordifolia* (Asteraceae). Grass names (Poaceae) follow the Catalogue of New World Grasses (Soreng et al. 2000, continuously updated). Following the work of Luebert et al. (2016; see also Stevens 2001), the Boraginales species in the study area are placed in four families: Boraginaceae, Heliotropiaceae, Hydrophyllaceae, and Namaceae. The provisional name *Yucca* cf. *schottii* (Asparagaceae) is used for a common perennial succulent with stiff leaf tips that has been called *Y. madrensis* Gentry as well as *Y.* x *schottii*, a collective term for hybrids among *Y. baccata* Torrey, *Y. elata* Engelmann, and *Y. schottii* Engelmann (Lenz & Hanson 2000, 2001). The taxonomy of this yucca lacks consensus (e.g., Hess & Robbins 2002).

COMPOSITION OF THE FLORA

A total of 788 taxa at or below the specific level (780 species plus 8 additional infraspecific taxa) in 445 genera and 103 families is recorded in the study area (Table 1). The largest families are Asteraceae, Poaceae, and Fabaceae (Table 2), accounting for 40% of the flora. The largest genera are *Muhlenbergia, Euphorbia,* and *Cyperus* (Table 3). Non-natives comprise 69 species, accounting for 8.8% of the total; 34 non-natives (49%) are grasses. Trees are represented by 24 species (3% of total flora); woody shrubs total 77 (10%), subshrubs 41 (5%), herbaceous perennials 351 (45%), and annuals (including biennials) 295 (37%).

Non-natives and human-caused introductions. Several species were introduced historically during ranching or mining. The non-native Chinese firethorn (*Pyracantha fortuneana*) persists on the ranch headquarters property without supplemental water. A single European olive tree (*Olea europea*) at the Salero Mine was likely planted by miners in the early 20th century (Betsy Wirt, pers. comm., July 2018). It is 5.5 m (18 ft) tall, with many suckers at its base and a shrub 0.6 m (2 ft) tall growing (from a root?) about 2.5 m (8 ft) away from the main tree. Four small pomegranate shrubs (*Punica granatum*) also persist near one of the buildings.

Taxonomic group	Families	Genera	Species	Additional infraspecific taxa	Total taxa*
Pteridophytes	5	11	23	0	23
Gymnosperms	2	2	3	0	3
Magnoliids	1	1	1	0	1
Angiosperms: Eudicots	83	356	593	5	598
Angiosperms: Monocots	12	75	160	3	163
TOTAL	**103**	**445**	**780**	**8**	**788**

Table 1. Taxonomic composition of the flora.
*at or below the specific level

Family	Taxa*
Asteraceae	129
Poaceae	115
Fabaceae	72
Euphorbiaceae	28
Malvaceae	27
Brassicaceae	19
Cyperaceae	19
Pteridaceae	19
Cactaceae	17
Solanaceae	17

Table 2. Largest families in the study area.
*at or below the specific level

Family	Genus	Taxa*
Poaceae	*Muhlenbergia*	18
Euphorbiaceae	*Euphorbia*	17
Cyperaceae	*Cyperus*	13
Poaceae	*Bouteloua*	11
Fabaceae	*Dalea*	11
Asteraceae	*Brickellia*	8
Poaceae	*Eragrostis*	8
Convolvulaceae	*Ipomoea*	8
Poaceae	*Aristida*	7
Apocynaceae	*Asclepias*	7
Fabaceae	*Desmodium*	7
Asteraceae	*Erigeron*	7
Onagraceae	*Oenothera*	7

Table 3. Largest genera in the study area.
*at or below the specific level

At least six exotic species collected near the ranch headquarters buildings have not been found elsewhere in the study area. These include Sahara mustard (*Brassica tournefortii*), shepherd's-purse (*Capsella bursa-pastoris*), marsh-parsley (*Cyclospermum leptophyllum*), cheeseweed mallow (*Malva parviflora*), toothed medick (*Medicago polymorpha*), and common dandelion (*Taraxacum officinale*).

Plants that were likely introduced during subdivision development and have become established include the non-natives fountaingrass (*Cenchrus setaceus*), Egyptian grass (*Dactyloctenium aegyptium*), and Mediterranean lovegrass (*Eragrostis barrelieri*) and the regionally native creosotebush (*Larrea tridentata*), which is locally established on a southwest-facing slope; the latter was probably imported in driveway gravels. Re-vegetation following a mine clean-up operation at the Alto Mine Group in the Santa Rita foothills brought in purple three-awn (*Aristida purpurea* var. *purpurea*) and desert senna (*Senna covesii*), both native to Arizona but probably not to the study area. Landscaping plants brought in by current or recent Salero Ranch residents were excluded from the study.

Exotic grasses. Thirty-four (49%) of Salero Ranch non-native species are grasses, but a handful of these account for the majority of grass coverage. Weeping lovegrass (*Eragrostis curvula*) and Lehmann lovegrass (*E. lehmanniana*) are widespread and in places comprise nearly 100% cover, although each generally occupies its own niche. Weeping lovegrass is more common on north-facing slopes among oaks, especially in the foothills of the Santa Rita Mountains (northeast part of the study area). Lehmann lovegrass forms dense stands along roadsides and on level or mostly level ground. Beginning in the 1930s, both of these South African lovegrasses were introduced into Arizona for forage and to combat erosion due to overgrazing (Cox & Ruyle 1986). From the 1940s to the 1980s, they were intentionally seeded on 69,000 ha (170,000 ac) of Arizona rangeland by ranchers and range managers (Robinett 1992, Uchytil 1992, Gucker 2009). Lehmann lovegrass was aerially seeded across Salero Ranch in the late 1980s (John Hudson, pers. comm., May 2018). Both Lehmann and weeping lovegrass have spread extensively and are firmly established in many southeast Arizona grasslands (Anable et al. 1992, Robinett 1992). Weeping lovegrass displaces native grasses via allelopathy (Ghebrehiwot et al. 2014); the early or bi-seasonal flowering of both lovegrasses allows them to out-compete the natives (Bowers & McLaughlin 1982, McLaughlin & Bowers 2006). They also out-compete or inhibit native forbs (Bock et al. 1986, McLaughlin & Bowers 2006).

Other exotic grasses tell a variety of stories. Bermuda grass (*Cynodon dactylon*) occurs in nearly every canyon bottom or seasonal drainage in the study area and along road margins. Buffelgrass (*Cenchrus ciliaris*), a major ecological threat in the Sonoran Desert, occurs in at least seven localities on the ranch but so far does not appear to be spreading aggressively. Rose natal grass (*Melinis repens*), on the other hand, had a patchwork presence across the study area for many years, but beginning in 2014 it accounted for 80–90% cover on several south-facing rocky slopes, turning them pink in the fall. Natal grass continues to spread quickly throughout the study area and the region; it roots in rock crevices and under boulders and creates significant biomass that is difficult to remove. Mediterranean lovegrass (*Eragrostis barrelieri*), tickgrass (*E. echinochloidea*), and Wilmen lovegrass (*E. superba*) are expanding along road margins and sandy drainages in scrub grassland. Yellow bluestem (*Bothriochloa ischaemum*) recently appeared in several localities in the study area, including scrub grassland and encinal in the foothills of the Santa Rita Mountains. Kleingrass (*Panicum coloratum*), a rhizomatous

panicgrass native to Africa, has been collected at three localities in scrub grassland and is strongly established at two of them. Red brome (*Bromus rubens*) is occasional in scrub grassland and encinal; a photo from 2014 at the south end of the ranch appears to be cheatgrass (*B. tectorum*) but that species has not yet been vouchered for the study area.

Calcareous substrates. Unlike the nearby Santa Rita Mountains, the Salero Ranch study area has no mapped limestone formations, but gravelly, calcium-rich soils and calcareous rock outcrops are common. These substrates support three species that are otherwise rare in the study area: featherplume dalea (*Dalea formosa*), Wright's prairie-clover (*Dalea wrightii*), and paleface mallow (*Hibiscus denudatus*). Table 4 lists species commonly found on—but not necessarily exclusive to—calcareous substrates in the study area.

Family	Species	Common name
Asteraceae	*Bahia absinthifolia*	hairyseed bahia
Asteraceae	*Chaetopappa ericoides*	smallflower aster
Asteraceae	*Porophyllum gracile*	odora
Asteraceae	*Thymophylla pentachaeta* var. *belenidium*	five-needle pricklyleaf
Asteraceae	*Zinnia acerosa*	desert zinnia
Euphorbiaceae	*Croton pottsii*	leatherweed
Fabaceae	*Astragalus arizonicus*	Arizona milkvetch
Fabaceae	*Dalea formosa*	featherplume dalea
Fabaceae	*Dalea nana*	dwarf prairie-clover
Fabaceae	*Dalea pogonathera*	bearded prairie-clover
Fabaceae	*Dalea pringlei*	Pringle's prairie-clover
Fabaceae	*Dalea wrightii*	Wright's prairie-clover
Fabaceae	*Marina calycosa*	San Pedro false prairie-clover
Fouquieriaceae	*Fouquieria splendens*	ocotillo
Krameriaceae	*Krameria erecta*	range ratany
Krameriaceae	*Krameria lanceolata*	trailing ratany
Lamiaceae	*Clerodendrum coulteri*	Coulter's wrinklefruit
Malpighiaceae	*Cottsia gracilis*	slender janusia
Malvaceae	*Hibiscus coulteri*	Coulter's hibiscus
Malvaceae	*Hibiscus denudatus*	paleface mallow
Polygalaceae	*Hebecarpa barbeyana*	blue milkwort
Solanaceae	*Chamaesaracha coronopus*	greenleaf five-eyes
Poaceae	*Aristida purpurea* var. *nealleyi*	Nealley's three-awn
Poaceae	*Bouteloua eludens*	elusive grama
Poaceae	*Bouteloua eriopoda*	black grama
Poaceae	*Dasyochloa pulchella*	fluffgrass
Poaceae	*Tridens muticus*	slim tridens

Table 4. Species commonly found on calcareous substrates in the study area.

Figure 10. Seasonal drainage in Grosvenor Hills, looking north to Mount Wrightson, August 2013.

RARE AND INTERESTING PLANTS

This section highlights two species new to the United States, two species new to Arizona and the southwestern U.S., new localities for species with sparse distributions in Arizona, and other uncommon or interesting plants.

***Polystemma* sp. (Apocynaceae).** Figure 11(A). A woody, perennial vine with small, blackish flowers was collected in May 2019 on a south-facing, bouldery slope in the southwest Grosvenor Hills. At least seven plants were present. Two more plants were found about 1 km southeast of the first location. The stems have both simple and glandular hairs, the leaves are heart-shaped, and the follicles are smooth, mottled with dark and light green, and spindle-shaped. According to Mark Fishbein (pers. comm., June 2019), the plants are an undescribed *Polystemma* species (a genus segregated from *Matelea*; see Fishbein 2017). Specimens have been included in *Matelea tristiflora* (Standley) Woodson, which differs in part by its larger flowers and a more southern distribution. This *Polystemma* has not been previously reported for the U.S., but a plant was found in 2002 in Agua Caliente Canyon, Santa Rita Mountains, by Dennis Caldwell (pers. comm., January 2020). The nearest known Mexican population is 52 km (32 mi) to the south, in the Sierra Pinitos, east of Cibuta, Sonora (*Reina-G. 2005-514*, OKLA).

***Ipomoea muricata* (Convolvulaceae).** Figure 11(B). Two small plants were found in Josephine Canyon in October 2019. Purple moonflower is an annual morning-glory species

with large heart-shaped leaves and lavender flowers. The stems are green to purplish with soft, warty prickles, and the capsules are nearly 2 cm in diameter. This is a first record for Arizona. The species is native to Mexico and considered adventive in the southeastern United States, especially as a contaminant in soybean seeds (Felger et al. 2012), but the Arizona plants may be a natural occurrence.

***Sida glabra* (Malvaceae).** Figure 11(C). The Salero populations of this subshrub were first records for Arizona and the western United States (Carnahan 2017) and likely represent the first natural occurrences of this species north of Mexico. *Sida glabra* is widespread and relatively common in Mexico, including in Yécora, Álamos, and the Guaymas region (Felger et al. 2017a) of Sonora; it is considered an introduced plant in Florida (Fryxell & Hill 2015). It was collected from three localities near the south end of the study area: upper Fresno Canyon, where at least 10 plants were found on a rocky slope near the canyon bottom, and two drainages at the south end of the Grosvenor Hills, one of which held more than 60 plants. The nearest records for *S. glabra* are 115 km (71 mi) south of the study area, near Magdalena, Sonora. The flowers are pale yellow-orange and the herbage is hairy; the plants flower in spring and summer–fall.

***Solanum houstonii* (Solanaceae).** Figure 11(D). A localized population of this prickly, shrub-sized nightshade, known in Sonora as *sacamanteca*, was found in September 2019 on a south-facing rocky slope in the southern Grosvenor Hills. This is a first record for the United States; the species (synonym *S. tridynamum* Dunal) is otherwise endemic to but widespread in Mexico, at elevations from sea level to about 2000 m (Knapp et al. 2017). The nearest collections are at least 85 km south of the study area, near Ímuris and Magdalena, Sonora, although Sky Jacobs (pers. comm., February 2020) photographed it in the Baboquivari Mountains, Pima County. *Sacamanteca* is characterized by prickly stems and calyces, shallowly lobed leaves, purple flowers, staminate flowers with anthers of two very different lengths, and fruits held erect.

***Cynanchum ligulatum* (Apocynaceae).** Figure 11(E). A localized population of Mexican swallow-wort occurs in Hangmans Canyon in the southeast part of the study area. This herbaceous perennial vine is recognized by its glabrous, heart-shaped leaves and clusters of small white flowers. The U.S. distribution of Mexican swallow-wort is known from a handful of records across Cochise, Pima, and Santa Cruz counties; it ranges widely in Mexico.

***Metastelma mexicanum* (Apocynaceae).** Figure 11(F). Wiggins' swallow-wort (synonym *Cynanchum wigginsii*) was found in two encinal localities in the study area: a bouldery slope in the Grosvenor Hills and a rocky slope near Viceroy Mine Canyon in the Santa Rita foothills. This uncommon, self-twining perennial has narrowly linear, dark green leaves, small white flowers, and spindle-shaped follicles; it is known from Santa Cruz and Cochise counties and Sonora, Mexico.

***Adenophyllum porophyllum* (Asteraceae).** Figure 11(G). Poreleaf dogweed is a frequent summer-blooming annual in scrub grassland and open areas in encinal. It has been documented from Cochise and Santa Cruz counties in addition to a wide range of localities in Mexico, but it is only recently reported for the United States (Carnahan 2019).

The annual habit and pectinate (comb-like) bracts of *Adenophyllum porophyllum* differentiate it from the related perennial species *A. porophylloides,* found in desert habitats in the southwest U.S. and northwest Mexico. The lack of ray flowers distinguishes it from the rare annual *A. wrightii* A. Gray as well as the Mexican species *A. anomalum* (Canby & Rose) Strother and *A. cancellatum* (Cassini) Villareal [*A. porophyllum* var. *cancellatum* (Cassini) Strother]. See Carnahan 2019 for a key to Arizona *Adenophyllum*.

***Ageratina thyrsiflora* (Asteraceae).** Figure 12(A). A small population of congested snakeroot was found in September 2019 on a rocky grassland slope near the south end of the Grosvenor Hills. *Ageratina thyrsiflora* had not been recorded in the United States since 1929, when it was collected near Nogales, Arizona (Nesom 2006). This herbaceous perennial is characterized by erect, mostly unbranched stems; strongly alternate leaves; short, upcurved, whitish hairs on stems and leaves; and white flowers. It ranges across northwest Mexico from Sonora to Chihuahua and south to Jalisco.

***Lagascea decipiens* var. *decipiens* (Asteraceae).** Figure 12(B). Lagascea or *confiturilla grande* grows on south- and east-facing cliffs and rock slopes in the Grosvenor Hills. A showy shrub, it flowers most profusely during the summer monsoon but can flower nearly any time of year following rains. Its bright yellow flowers are held in rounded clusters of single-flowered heads. Lagascea is widespread in Sonora, but its Arizona range is limited to central and western Santa Cruz County and southwestern Pima County. A population of at least 60 plants was recently documented on State Trust Land a few hundred feet north of the study area (*Carnahan 3622,* SEINet).

***Mammillaria wrightii* var. *wilcoxii* (Cactaceae).** Figure 12(C). Wilcox's nipple cactus occurs in encinal in the flora area. This uncommon stem succulent typically flowers within a week or two following the start of monsoon rains. Its soft, dark green stems and large flowers with brilliant, fuchsia-colored tepals separate it from the similar fishhook pincushion (*M. viridiflora*) and Graham's nipple cactus (*M. grahamii*). Wilcox's nipple cactus is easily overlooked among boulders and perennial grasses in the shade of oaks. It also appears to be short-lived, or perhaps drought-sensitive: several plants growing in protected spots disappeared during the course of this survey. Its range includes southeast Arizona, southwest New Mexico, and Chihuahua and Sonora, Mexico.

***Opuntia santarita* (Cactaceae).** Figure 13(A, B). With its purplish pads and relatively upright habit, Santa Rita prickly pear is a common and conspicuous shrub on rocky grassland slopes in the flora area, especially toward the northern boundary. This plant has been variously known as *O. chlorotica* Engelmann & J. M. Bigelow var. *santarita* Griffiths & Hare, *O. gosseliniana* F. A. C. Weber var. *santarita* (Griffiths & Hare) L. D. Benson, *O. santarita* (Griffiths & Hare) Rose, and *O. violacea* Engelmann ex B. D. Jackson var. *santarita* (Griffiths & Hare) L. D. Benson. Genetic analyses by Majure and Puente (2014) suggest it is closely related to *O. gosseliniana.*

Thibault and Guiggi (2015) attempted to pin down the type locality for *O. chlorotica* var. *santarita,* noted originally as follows: "No. 8157 D. G. collected in Celero mountains, Arizona, October 8, 1905" (Griffiths and Hare 1906: 64). The Celero mountains have usually been assumed to refer to the Santa Rita Mountains (e.g., Benson 1977), but Thibault and Guiggi

suggest that the name "Celero" in David Griffiths' field notes—later amended by hand by Griffiths to "Selero"—is a misspelling of "Salero" (Thibault & Guiggi 2015: 170). It is not clear if they had access to Griffiths' type specimen (US 2607623), but affixed to the specimen sheet is a clue: a 1905 photograph by Griffiths of the type specimen that shows Mount Wrightson and smaller peaks on the horizon (Figure 13[A]). By matching the orientation of this photograph to features on and near the study area, I narrowed the type locality to a rocky hill locally known as Poorwill Hill that straddles the northern boundary of Salero Ranch (Figure 13[B]). The precise spot may lie just within the study area or as much as 120 m (390 ft) north of it, on what is currently State Trust Land and would have been federal land in 1905.

***Graptopetalum bartramii* (Crassulaceae).** Figure 12(D). This uncommon perennial succulent grows in rock crevices and on steep slopes in encinal along Viceroy Mine Canyon in the northeast corner of the flora area. Bartram stonecrop is found in southeast Arizona and northern Mexico (Chihuahua and Sonora) and blooms in the fall. Its sister species in the state, Rusby's stonecrop (*G. rusbyi* [Greene] Rose), has a wider range in both Arizona and Sonora and blooms in the spring.

***Croton ciliatoglandulifer* (Euphorbiaceae).** Figure 12(E). A population of Mexican croton grows among boulders in the canyon bottom of upper Fresno Canyon, near the south end of the study area. It is widespread in Mexico but was previously known in Arizona only from the Pajarito Mountains in western Santa Cruz County. The Salero population represents a new locality for the shrub and a small northward range extension. Male and female flowers occur on the same plant; the leaf margins and peduncles bear distinctive long-stalked, yellow glands.

***Phacelia sonoitensis* (Hydrophyllaceae).** Figure 12(F). Sonoita phacelia was described from Sonoita Creek State Natural Area, just south of Salero Ranch (McLaughlin 2007). McLaughlin noted its typical habitat as talus and rocky slopes. This spring annual forb was collected from several localities in the study area, including a steep, bouldery slope below the north-facing Grosvenor Cliffs, where I noted more than 50 plants in a 400-m stretch of encinal. Other localities include Fresno Canyon, a tributary of Coal Mine Canyon, Hangmans Canyon, the west slopes of the Grosvenor Hills, and a rocky ridge near ranch headquarters—the northernmost known locality. In April 2017, I collected Sonoita phacelia (*Carnahan 2436*) on Rancho Los Ojos in northeastern Sonora, Mexico, and in July 2019, I documented it (*Carnahan 3851*, SEINet) near Bacoachi, Sonora, 125 km southeast of the study area. The species undoubtedly occurs more widely in the U.S.–Mexico border region.

***Anoda crenatiflora* (Malvaceae).** Figure 12(G). A small population of thicket anoda was found along Josephine Canyon near the westernmost edge of the study area. Its pale yellow flowers distinguish it from *A. cristata,* and its annual habit, thin hastately lobed leaves, and small flowers separate it from *A. abutiloides.* Known in Arizona from a handful of collections in Santa Cruz and Cochise counties, thicket anoda ranges widely in Mexico.

***Pseudabutilon thurberi* (Malvaceae).** Figure 14(A). A robust population of Thurber's Indian mallow occurs on a cobble and gravel bench along Josephine Canyon at the western edge of the study area. In August 2018, the population numbered more than 250 plants. The combination of long spreading stem hairs, small orange-yellow flowers, and five 1- to 3-seeded

mericarps with recurved spines is distinctive. This rare species is otherwise known in Arizona from the Baboquivari Mountains in Pima County; it also occurs in Mexico (Sonora and Baja California Sur).

***Hedyotis vegrandis* (Rubiaceae).** Figure 14(B). Little star-violet was collected in August 2017 on the margin of a large pond in the south part of the study area that was fenced off from cattle around 2016. This diminutive annual forb has white flowers 1–2 mm long; the bilobed fruits are borne on recurved pedicels. The only other Arizona record for this *Hedyotis* is from Guadalupe Canyon in southeast Cochise County (Dempster & Terrell 1995), although it occurs in northern Mexico.

***Limosella acaulis* (Scrophulariaceae).** Figure 14(C). Owyhee mudwort, an obligate wetland annual species, occurs in two localities in the southeast part of the ranch: Cieneguita Spring and a small hillside seep along Cieneguita Canyon. At Cieneguita Spring, the plants grow in a saturated swale downhill from a developed spring box and overflowing cattle trough. Although the genus *Limosella* has a wide range across the western United States, there appear to be few recent collections from southern Arizona, perhaps due to habitat scarcity. *L. pubiflora* Pennell has been recorded in Cochise County and may be a regional variant of *L. acaulis* (Crawford et al. 2018). Mudwort plants require an aquatic or semi-aquatic habitat, including lakes, ponds, marshes, and ciénagas, any of which could be threatened by a warming and drying climate. In the study area, the overflowing cattle trough and hillside seep are precarious resources on which to sustain a population of this uncommon species.

***Cyperus amabilis* (Cyperaceae).** Figure 14(D). A population of foothill flatsedge was discovered in October 2018 along a shallow rocky drainage near Ash Canyon. This annual sedge occurs in western and southern Mexico and has been previously documented from the Huachuca Mountains in Cochise County and the Patagonia Mountains in Santa Cruz County. The Salero Ranch population represents a northern and western range extension for the species.

***Bouteloua eludens* (Poaceae).** Figure 14(E). Elusive grama is not rare, nor diminutive at 50 cm tall, nor does it hide away on inaccessible clifftops. Nonetheless, it is aptly named. I was several years into this study before I realized I was seeing a "different" grama along my own driveway as well as on other gravelly, south-facing slopes in the study area. David Griffiths, who described the species from the north side of the Santa Rita Mountains, wrote, "This species occurs on familiar collecting ground where the most active botanical collectors have worked for years and where the writer collected for about three years before finding it" (Griffiths 1912: 402). John and Charlotte Reeder concurred: "We ourselves had made collections of grasses on several occasions over a period of years within the reported range of *Bouteloua eludens* before we recognized it" (Reeder & Reeder 1990: 19).

Superficially similar to sprucetop grama (*B. chondrosioides*), with which it often co-occurs, *B. eludens* has smaller but more numerous panicle branches (spikes). The range of elusive grama appears limited to Cochise, Pima, and Santa Cruz counties and Sonora, Mexico. Griffiths reported, "I have seen or collected it on the slopes of the Cananea Mountains, in the Celero [Salero? see *Opuntia santarita* discussion above] Mountains, where it is most abundant, and in the Santa Rita and Santa Catalina Mountains" (1912: 402).

***Microchloa kunthii* (Poaceae).** Figure 14(F). Smallgrass is relatively frequent in the study area, in level, shallow, gravel-filled depressions in Squaw Gulch granite. A diminutive tufted perennial with very slender inflorescence spikes, smallgrass is known in Arizona from the Baboquivari, Huachuca, and Santa Rita mountains and two other localities in western Santa Cruz County and southern Pima County; its wider range is pantropical.

***Muhlenbergia palmeri* (Poaceae).** Figure 14(G). Palmer muhly is a rare bunchgrass documented from perhaps 10 localities in Pima and Santa Cruz counties, southwestern New Mexico, and Sonora, Mexico. The Salero population was found in December 2018 in a small sandy wash in scrub grassland near the south end of the study area. When flowering, the plants are similar to *M. longiligula* but with shorter ligules, narrower and shorter panicles, and longer awns. When not flowering, they can resemble *M. rigens* but are distinguished in part by the presence of awns.

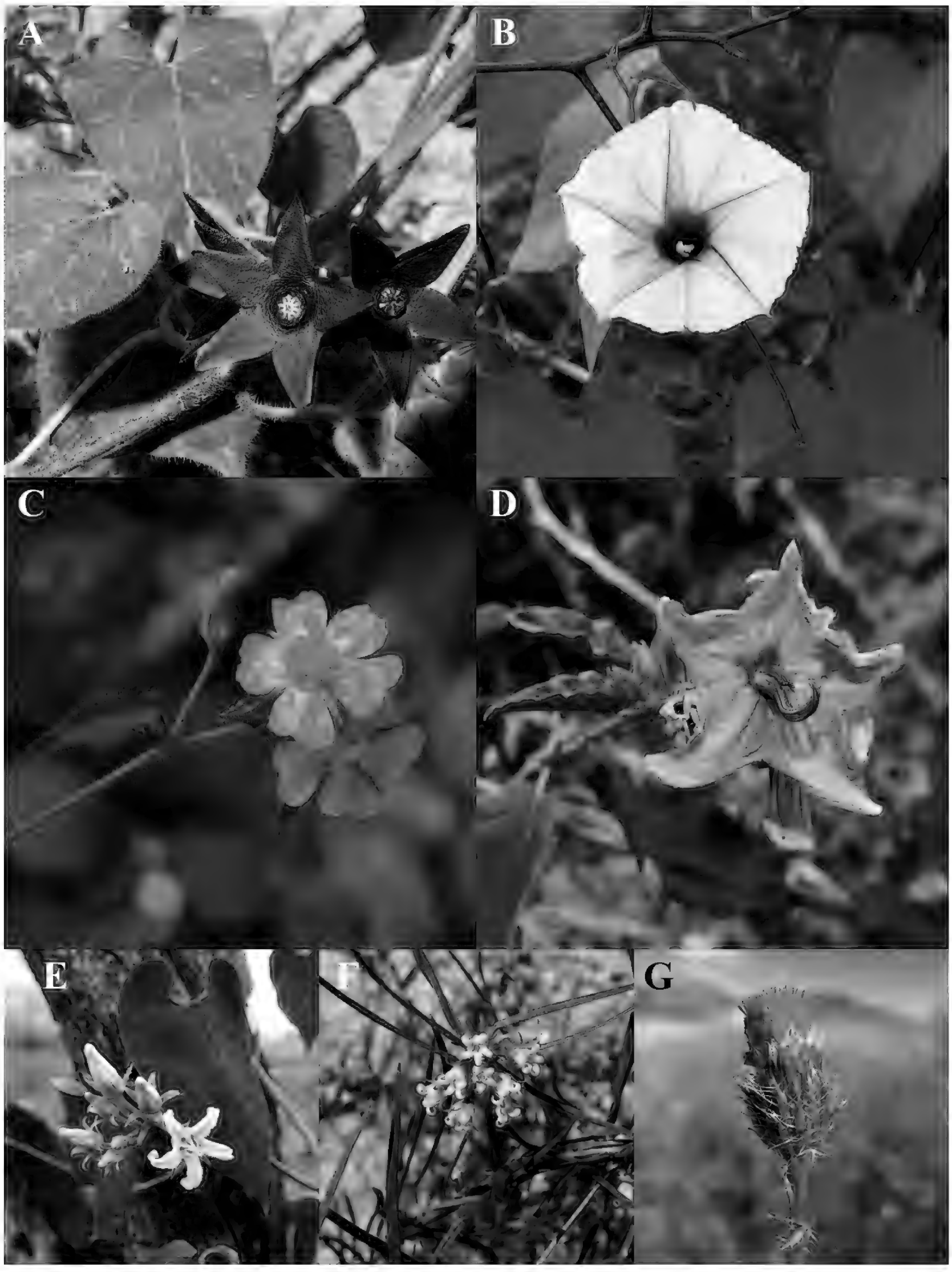

Figure 11. (A) *Polystemma* sp.; (B) *Ipomoea muricata*; (C) *Sida glabra*; (D) *Solanum houstonii*; (E) *Cynanchum ligulatum*; (F) *Metastelma mexicanum*; (G) *Adenophyllum porophyllum*.

Figure 12. (A) *Ageratina thyrsiflora*; (B) *Lagascea decipiens*; (C) *Mammillaria wrightii* var. *wilcoxii*; (D) *Graptopetalum bartramii*; (E) *Croton ciliatoglandulifer*; (F) *Phacelia sonoitensis*; (G) *Anoda crenatiflora*.

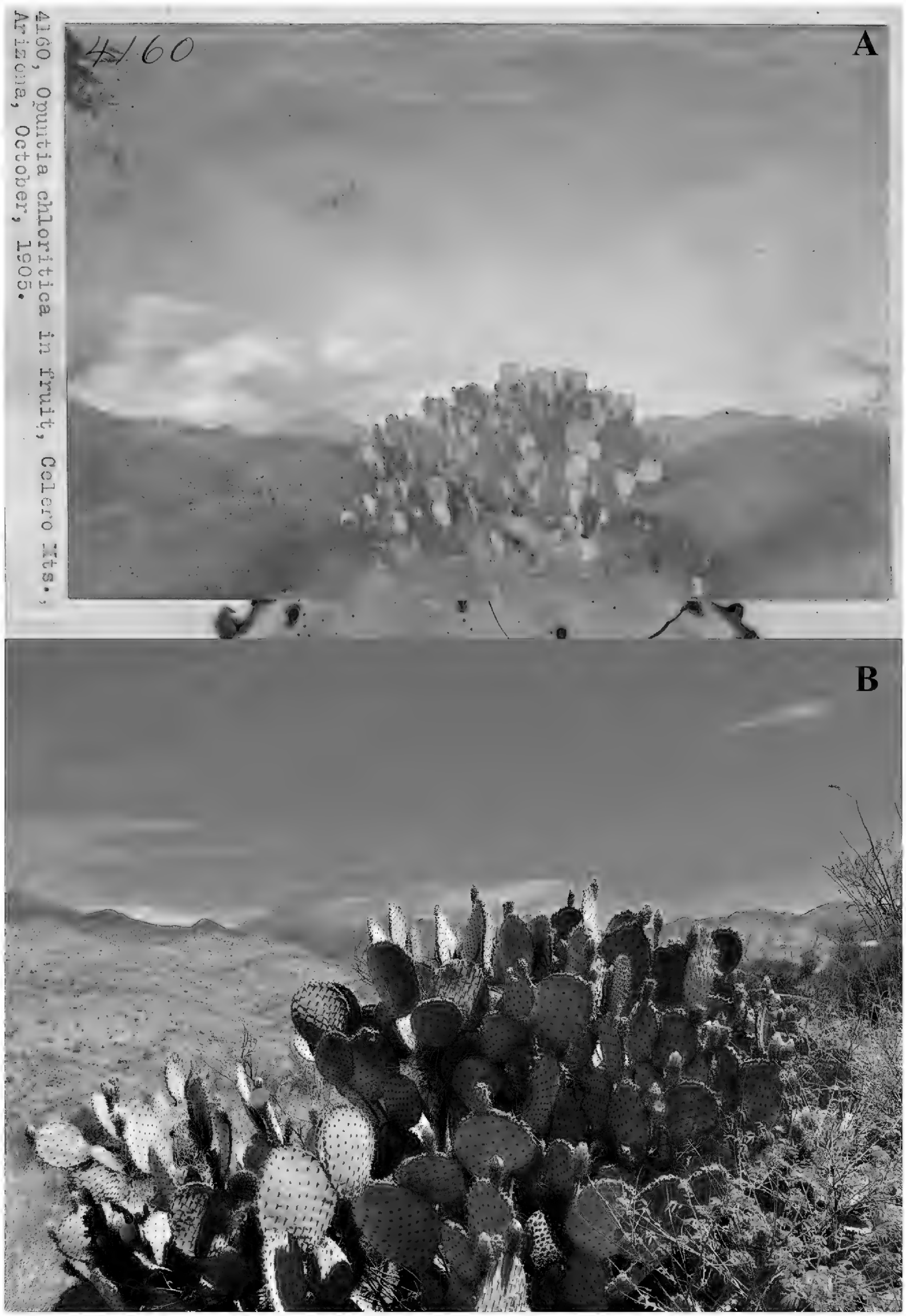

Figure 13. (A) *Opuntia chlorotica* var. *santarita,* October 1905, photo by David Griffith, scan courtesy of Smithsonian Institution; (B) *Opuntia santarita,* May 2018, on Poorwill Hill, Salero Ranch, 31.61147°N, 110.90371°W.

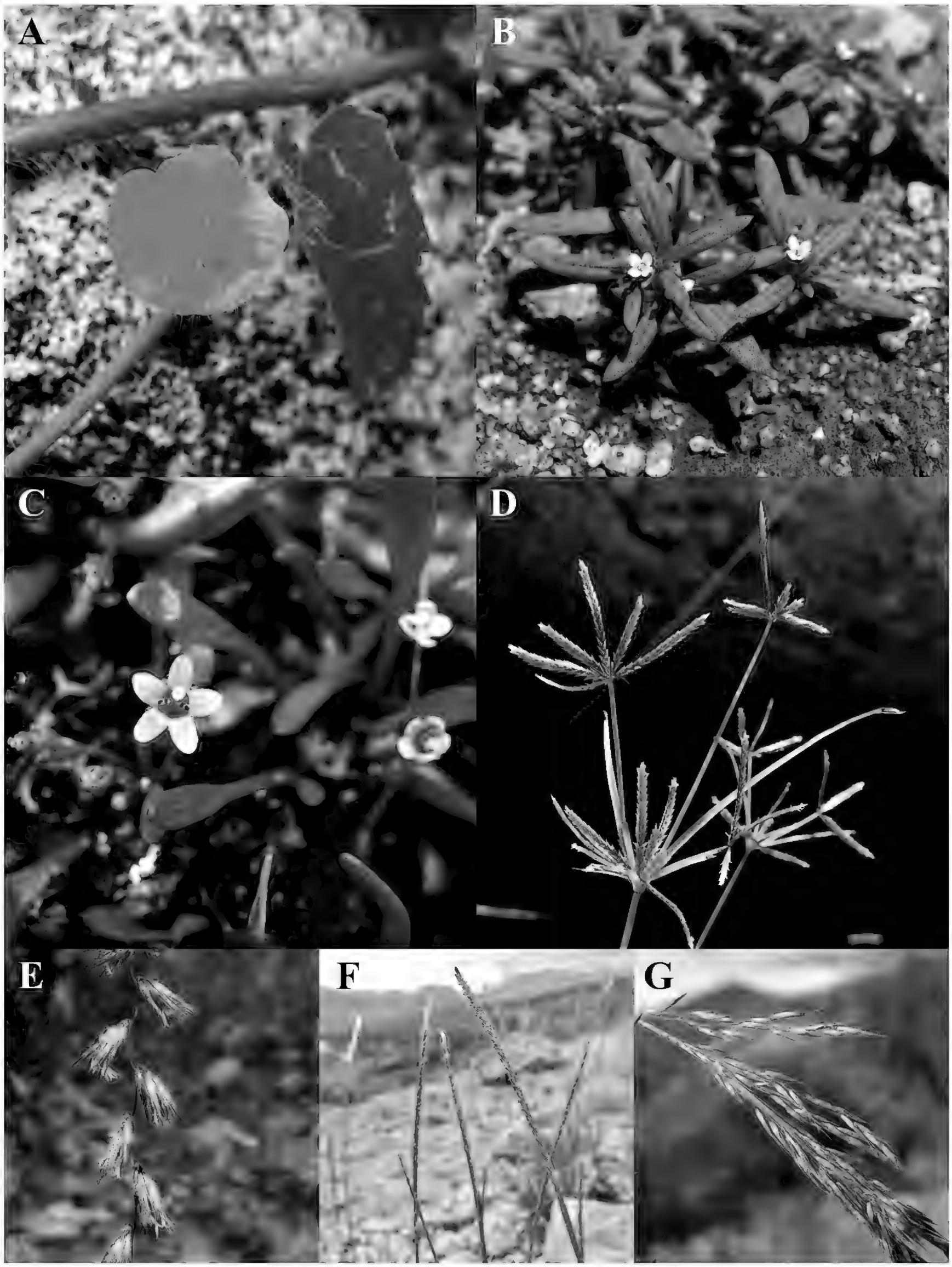

Figure 14. (A) *Pseudabutilon thurberi*; (B) *Hedyotis vegrandis*; (C) *Limosella acaulis*; (D) *Cyperus amabilis*; (E) *Bouteloua eludens*; (F) *Microchloa kunthii*; (G) *Muhlenbergia palmeri*.

FACTORS CONTRIBUTING TO SPECIES RICHNESS

The flora of Salero Ranch is surprisingly rich in species despite a century or more of "cattilation" (all manner of disturbance by cattle, including grazing and trampling) and silver mining. There are likely several contributing factors, including the generally high floristic diversity of the Sky Islands region. Table 3 compares the flora of the study area with those of regional grasslands as well as the nearby Santa Rita Mountains.

Flora	Total taxa*	Non-native %	Study area size (ha)	Elevation range (m)	Effort (yrs)	Effort (trips)	Public/ private
Santa Rita Mountains[1]	1142	7.9	61,047	1814	2.75	101	public
Salero Ranch	**788**	**8.8**	**6541**	**784**	**6.5**	**360+**	**private**
Buenos Aires National Wildlife Refuge[2]	615	8	45,540	475	3	35	public
Sonoita Creek State Natural Area[3]	561	6.4	1990	230	1.4	34	public
Appleton-Whittell Research Ranch[4]	511	7.4	3160	153	2	n/a	mixed
San Rafael State Park[5]	457	10.9	1440	80	1.4	28	public
Pat Hills Desert Grassland[6]	447	6	~6000	~180	3	138	private

Table 5. A comparison with floras of regional grasslands and nearby mountains.
*at or below the specific level
[1]Verrier, Carnahan, & Rodden (in progress); [2]McLaughlin 1992; [3]McLaughlin 2006; [4]McLaughlin et al. 2001; [5]McLaughlin 2006; [6]Roll 2018.

In an analysis of 20 Arizona floras, Bowers and McLaughlin (1982) found that elevational range and sampling effort accounted for most of the species richness; of secondary importance were the particular vegetative communities, sources of permanent water, and the presence of major canyon systems. Bennett and Kunzmann (1992) identified terrain roughness, or the prevalence of canyon habitats, as a major factor underlying the species richness of the Sky Island ranges of southeast Arizona. In addition, several studies have pointed to scrub grassland and oak woodland as two of the most species-rich vegetative associations in the Sky Islands region (Whittaker & Niering 1975, Bowers & McLaughlin 1982, McLaughlin & Bowers 2006).

Sampling effort in the current study was very high because of the six-year duration and my full-time residence on the ranch. Although the study area is not a mountain range, the terrain is distinctly unlevel, with 784 meters of elevational range and fractured and faulted topography producing bouldery slopes and other microhabitats (see Figure 3). Permanent water is limited to perennial springs, cattle ponds and associated drainages, and parts of lower Bond Canyon, but these habitats support regionally uncommon species such as Pacific mosquitofern (*Azolla filiculoides,* Salviniaceae), western umbrella sedge (*Fuirena simplex,* Cyperaceae), blue mudplantain (*Heteranthera limosa,* Pontederiaceae), and Owyhee mudwort (*Limosella*

acaulis, Scrophulariaceae). Lastly, the flora area is dominated by diverse vegetative communities: grassland and encinal.

FUTURE CONSIDERATIONS

This flora documents the existing species richness of a scrub grassland community that was mined for over 200 years and has been privately owned and grazed by cattle for more than 100 years. Unlike in the nearby Santa Rita Mountains (Verrier et al., in prep.), mining is no longer an active concern within the Salero Ranch boundary. Ongoing threats to the flora, however, include residential development, damage by cattle (especially during drought), the spread of invasive species, and long-term climate change.

Residential development fragments habitat, removes native vegetation, introduces exotic species, and encourages the spread of weedy native species. Over time these influences will degrade the flora. The number of cattle in the study area has decreased over the past half-century and has remained at its present level for the past 20 years, but during the current long-term regional drought, the effects of grazing are magnified, especially in sensitive riparian areas. Trespass cattle from adjacent overgrazed ranches further impact the study area. Invasive grass species including Natal grass and the recently arrived yellow bluestem are increasing their foothold and competing for dominance, even against other exotic grasses. Add to all this the uncertainty of climate change, and the long-term prospects for this grassland flora are not encouraging.

Against this backdrop of threats, however, are several mitigating factors. The study area's location, sandwiched between Coronado National Forest and Sonoita Creek State Natural Area, and its distance from congested urban centers such as Tucson and Nogales insulate it somewhat from disturbance and development pressures. The pace of development has been slow, at an average of one new home per year since the launch of the subdivision, and the minimum lot size of 14.5 hectares has less impact than that of higher-density development. The prevalence of cliffs, canyons, rocky drainages, and steep, rocky hillsides in the study area means that many parts of the study area are unbuildable and rarely visited by people or cattle.

The results of this survey reveal an unexpectedly rich flora in the grasslands of a private cattle ranch. Many botanists, not surprisingly, focus their collecting efforts on public lands, particularly the scenic forests of the sky islands, but there is much to learn from inventories of non-public land as well. As others have demonstrated (McLaughlin et al. 2001; Roll 2018), private lands can harbor rare plants, new records for Arizona, and possibly undescribed species. Access to private land may be more difficult to obtain, but it is not impossible.

Figure 15. (Top) Tejano Spring with cattle troughs and wet meadow, July 2011. (Bottom) Cement-dammed cattle pond with knotgrass (*Paspalum distichum*) in foreground and Goodding willow (*Salix gooddingii*) near the dam, August 2015.

ANNOTATED CHECKLIST OF VASCULAR PLANTS

In the following checklist, growth forms and typical habitat within the study area are given. Selected synonyms are included. Species not native to the United States according to the U.S. Department of Agriculture (USDA, NRCS 2019) are marked with an asterisk (*); exceptions are made for plants native to Sonora, Mexico, that are likely of natural occurrence in the study area (e.g., *Macroptilium gibbosifolium*). Plants native to the United States but considered introduced to the study area (e.g., *Larrea tridentata*) are marked with a number sign (#). Both * and # are counted as non-natives. All specimens were deposited at the University of Arizona Herbarium (ARIZ) unless otherwise noted by the standard abbreviation for herbaria (Thiers 2019). Image vouchers on the SEINet Portal Network were used for a few species that are rare in the study area or the region (e.g., *Habranthus longifolius*) or were inaccessible (*Ericameria cuneata* var. *spathulata*); such records are noted as "(SEINet)." Collection numbers (SC 1–SC 1221 and 1222 onward) are mine unless a collector's name is given.

PTERIDOPHYTES

MARSILEACEAE

Marsilea mollis B. L. Robinson & Fernald. Aquatic or amphibious perennial; cattle ponds in scrub grassland. *SC 679, SC 1206; Harlan AH-03-24*

PTERIDACEAE

Argyrochosma incana (C. Presl) Windham. Perennial; shaded rock crevices in scrub grassland and encinal. *SC 256, SC 1099, 2021, 3218*

Argyrochosma limitanea (Maxon) Windham subsp. *limitanea*. Perennial; rocky drainages in scrub grassland and encinal. *SC 254, SC 889, 2552*

Astrolepis integerrima (Hooker) D. M. Benham & Windham. Perennial; rocky ledges in scrub grassland. *SC 263, SC 360, 3220*

Astrolepis sinuata (Lagasca ex Swartz) D. M. Benham & Windham subsp. *sinuata.* Perennial; rocky slopes in scrub grassland and encinal. *SC 258, 1260*

Astrolepis windhamii D. M. Benham. Perennial; rocky drainages in encinal. *SC 553*

Bommeria hispida (Mettenius ex Kuhn) Underwood. Perennial; rocky slopes in scrub grassland and encinal. *SC 272, 3583*

Myriopteris aurea (Poiret) Grusz & Windham [*Cheilanthes bonariensis* (Willdenow) Proctor. For all *Cheilanthes* nomenclatural changes, see Grusz & Windham 2013]. Perennial; rock crevices along drainages in encinal. *SC 392*

Myriopteris fendleri Fournier [*Cheilanthes fendleri* Hooker]. Perennial; rocky slopes in encinal. *SC 266, 3535*

Myriopteris lindheimeri (Hooker) J. Smith [*Cheilanthes lindheimeri* Hooker]. Perennial; rock ledges in scrub grassland and encinal. *SC 262, 3612*

Myriopteris rufa Fée [*Cheilanthes eatonii* Baker]. Perennial; encinal. *SC 267, SC 887*

Myriopteris wootonii (Maxon) Grusz & Windham [*Cheilanthes wootonii* Maxon]. Perennial; encinal. *SC 279, 1368*

Myriopteris wrightii (Hooker) Grusz & Windham [*Cheilanthes wrightii* Hooker]. Perennial; rocky ground in scrub grassland and encinal. *SC 265, SC 1062, 2554*

Notholaena grayi Davenport. Perennial; rocky slopes in scrub grassland and encinal. *SC 268, SC 273, 3584*

Notholaena standleyi Maxon. Perennial; rock clefts in Grosvenor Hills and along Fresno and Josephine canyons. *SC 259, 3859*

Pellaea atropurpurea (Linnaeus) Link. Perennial; encinal along Ash Canyon. *SC 893*

Pellaea intermedia Mettenius ex Kuhn. Perennial; shaded banks and outcrops in encinal. *SC 257*

Pellaea truncata Goodding. Perennial; rock outcrops and rocky drainages in scrub grassland and encinal. *SC 269, 3800*

Pellaea wrightiana Hooker [*P. ternifolia* var. *wrightiana* (Hooker) A. F. Tryon]. Perennial; rocky drainages in encinal. *SC 542, 1369*

Pentagramma triangularis (Kaulfuss) Yatskievych, Windham & E. Wollenweber subsp. *maxonii* (Weatherby) Yatskievych, Windham & E. Wollenweber. Perennial; rich soil below north-facing outcrops and cliffs in encinal. *SC 270, 1996, 3764*

SALVINIACEAE
Azolla filiculoides Lamarck. Winter annual; drainage below large cattle pond near ranch headquarters. *1641*

SELAGINELLACEAE
Selaginella rupincola Underwood. Perennial; rocky slopes and bedrock flats in scrub grassland and encinal. *SC 520, 3582*

WOODSIACEAE
Woodsia cochisensis Windham. Perennial; rocky, north-facing drainages in encinal. *SC 253, 3937*

GYMNOSPERMS
CUPRESSACEAE
Juniperus arizonica (R. P. Adams) R. P. Adams [*J. coahuilensis* (Martínez) Gaussen var. *arizonica* R. P. Adams]. Tree; scrub grassland and encinal, especially in south part of study area. *SC 495, 2125*
Juniperus deppeana Steudel. Tree; scrub grassland and encinal. *SC 518, 3588*

PINACEAE
Pinus discolor D. K. Bailey & Hawksworth [*P. cembroides* Zuccarini var. *bicolor* Little]. Small tree; mostly above 5000 feet in encinal in Santa Rita foothills. *SC 492, SC 494, 1945*

MAGNOLIIDS
ARISTOLOCHIACEAE
Aristolochia watsonii Wooton & Standley. Perennial vine; scrub grassland and encinal. *SC 116, 3670*

EUDICOTS
ACANTHACEAE
Anisacanthus thurberi (Torrey) A. Gray. Shrub; rocky slopes and seasonal drainages in scrub grassland and encinal. *SC 355, SC 1194, 3695*
Carlowrightia arizonica A. Gray. Perennial; rocky ground in scrub grassland. *SC 457, 2352*
Elytraria imbricata (Vahl) Persoon. Perennial; rocky slopes and drainages in scrub grassland and encinal. *SC 151, SC 1170*
Justicia longii Hilsenbeck [*Siphonoglossa longiflora* (Torrey) A. Gray]. Perennial; large population on rocky, south-facing slope in scrub grassland. *2647, 3739*
Tetramerium nervosum Nees. Perennial; seasonal drainages and rocky ground in scrub grassland. *SC 146, 2128*

ADOXACEAE (*Sambucus*), see **VIBURNACEAE**

AIZOACEAE
Trianthema portulacastrum Linnaeus. Summer annual; level ground in scrub grassland. *SC 620*

AMARANTHACEAE
**Alternanthera caracasana* Kunth. Perennial; disturbed ground in scrub grassland. *1966*
Amaranthus palmeri S. Watson. Summer annual; scrub grassland, especially cattilated areas. *SC 583, SC 659, 3273*
Amaranthus torreyi (A. Gray) Bentham ex S. Watson. Summer annual; rocky slopes and drainages in scrub grassland. *SC 665, 1895, 3496*
Atriplex canescens (Pursh) Nuttall. Shrub; scrub grassland. *SC 555, SC 556*
Atriplex elegans (Moquin) D. Dietrich. Summer annual; scrub grassland. *SC 557, 2638*
Blitum nuttallianum Schultes [*Monolepis nuttalliana* (Schultes) Greene; see Fuentes-Bazán et al. 2012]. Spring annual; sticky soil in scrub grassland west of Grosvenor Hills. *3589*
Chenopodium arizonicum Standley. Summer annual; scrub grassland and encinal. *SC 571, SC 682, SC 730, SC 731*

Dysphania graveolens (Willdenow) Mosyakin & Clemants [*Chenopodium graveolens* Willdenow]. Summer annual; encinal in Viceroy Mine Canyon. *SC 656, 1513*
Froelichia arizonica Thornber ex Standley. Perennial; scrub grassland and encinal. *SC 624, SC 632, SC 644*
Gomphrena caespitosa Torrey. Perennial; rocky level ground in scrub grassland. *SC 375, SC 448*
Gomphrena nitida Rothrock. Perennial; rocky slopes scrub grassland. *SC 203, SC 204, 2698*
Gomphrena sonorae Torrey. Perennial; rocky slopes in scrub grassland. *SC 147, 3235*
Guilleminea densa (Humboldt & Bonpland ex Willdenow) Moquin. Summer annual; level ground in scrub grassland. *SC 481*
Iresine heterophylla Standley. Perennial; rocky drainages in scrub grassland and encinal. *SC 260, 3275, 3547*
**Salsola tragus* Linnaeus. Non-seasonal annual; disturbed ground in scrub grassland. *SC 465*
Tidestromia lanuginosa (Nuttall) Standley. Summer annual; scrub grassland and Josephine Canyon. *3298*

ANACARDIACEAE
Rhus aromatica Aiton var. *trilobata* (Nuttall) A. Gray [*R. trilobata* Nuttall]. Shrub; seasonal drainages and north-facing slopes, in scrub grassland and encinal. *SC 16, SC 344*
Rhus virens Lindheimer ex A. Gray var. *choriophylla* (Wooton & Standley) L. D. Benson [*R. choriophylla* Wooton & Standley]. Shrub; cliffs, slopes, and seasonal drainages in scrub grassland and encinal. *SC 594, 1377*
Toxicodendron radicans (Linnaeus) Kuntze. Perennial; steep-sided, rocky drainages in scrub grassland and encinal. *SC 891*

APIACEAE
Bowlesia incana Ruiz and Pavón. Spring annual; shady areas in scrub grassland. *SC 304, SC 1065*
**Cyclospermum leptophyllum* (Persoon) Sprague ex Britton & P. Wilson. Spring annual; disturbed ground at ranch headquarters. *2957*
Daucus pusillus Michaux. Spring annual; rocky slopes in scrub grassland. *SC 404, 3657*
Lomatium nevadense (S. Watson) J. M. Coulter & Rose var. *parishii* (J. M. Coulter & Rose) Jepson. Perennial; rocky slopes in scrub grassland. *SC 290, 2313, 3587*
Spermolepis lateriflora G. L. Nesom [misapplied as *S. echinata* (Nuttall ex de Candolle) A. Heller]. Spring annual; scrub grassland. *SC 13, SC 1064, 2311, 3676*
Yabea microcarpa (Hooker & Arnott) Koso-Poljansky. Spring annual; north-facing slopes in scrub grassland and encinal. *SC 371*

APOCYNACEAE
Asclepias asperula (Decaisne) Woodson. Perennial; scrub grassland, usually in gravelly soil. *SC 414*
Asclepias elata Bentham. Perennial; seasonal drainages in scrub grassland and encinal. *SC 595, 1251*
Asclepias linaria Cavanilles. Shrub; rocky ground in scrub grassland and encinal. *SC 164, SC 1088*
Asclepias nummularia Torrey. Perennial; open, rocky ground in scrub grassland and encinal. *SC 8, 3481*
Asclepias nyctaginifolia A. Gray. Perennial; road margins and open ground in scrub grassland. *SC 82*
Asclepias quinquedentata A. Gray. Perennial; one plant in encinal in Santa Rita foothills. *3248*
Asclepias subverticillata (A. Gray) Vail. Perennial; scrub grassland slope with perennial spring at ranch headquarters. *3105*
Cynanchum ligulatum (Bentham) Woodson. Perennial vine; localized population in scrub grassland along Hangmans Canyon. *3889*
Funastrum crispum (Bentham) Schlechter [*Sarcostemma crispum* Bentham]. Perennial vine; scrub grassland and encinal. *SC 68*
Funastrum heterophyllum (Engelmann ex Torrey) Standley [*F. hartwegii* Schlechter. *Sarcostemma cynanchoides* Decaisne subsp. *hartwegii* R. W. Holm. *S. heterophyllum* Engelmann ex Torrey; for nomenclature, see Fishbein & Gandhi 2018]. Perennial vine; drainages in scrub grassland. *SC 473, 3016*
Gonolobus arizonicus (A. Gray) Woodson [*Matelea arizonica* (A. Gray) Shinners]. Perennial vine; drainages in scrub grassland and encinal in Grosvenor Hills. *1353, 1376, 1951, 3884*
Haplophyton cimicidum A. de Candolle [*H. cimicidum* var. *crooksii* L. D. Benson. *H. crooksii* (L. D. Benson) L. D. Benson]. Subshrub; rocky slopes and seasonal drainages in scrub grassland. *SC 318, 1240, 1994*
Mandevilla brachysiphon (Torrey) Pichon [*Macrosiphonia brachysiphon* (Torrey) A. Gray]. Subshrub; outcrops and rocky slopes in scrub grassland. *SC 71, 2566, 3490*

Metastelma mexicanum (Brandegee) M. Fishbein & R. Levin [*Cynanchum wigginsii* Shinners]. Perennial vine; rocky slopes in Grosvenor Hills and Viceroy Mine Canyon. *SC 261, 1478, 3569*

Polystemma sp. [undescribed]. Woody, perennial vine with small, blackish flowers, similar to *Matelea tristiflora* (Standley) Woodson; three populations in rocky scrub grassland in southwest and south Grosvenor Hills. First U.S. collection. *3807* (OKLA), *3858, 3913*; *Fishbein 7732* (ARIZ, OKLA)

ARALIACEAE

Aralia humilis Cavanilles. Shrub; north-facing slopes in scrub grassland and encinal. *SC 251, SC 655, 1978, 2121, 3549, 3621*

ASTERACEAE

Acourtia nana (A. Gray) Reveal & King [*Perezia nana* A. Gray]. Perennial; scrub grassland, often in shade of *Prosopis velutina*. *SC 412, 3004*

Acourtia thurberi (A. Gray) Reveal & King [*Perezia thurberi* A. Gray]. Perennial; boulder outcrops and rocky slopes in scrub grassland and encinal. *SC 202, 1986*

Acourtia wrightii (A. Gray) Reveal & R.M. King [*Perezia wrightii* A. Gray]. Perennial; rocky, calcareous slope in scrub grassland near ranch headquarters. *3758*

Adenophyllum porophyllum (Cavanilles) Hemsley. Summer annual; scrub grassland and encinal. *SC 160, 1508, 3485, 3495, 3513*

Ageratina herbacea (A. Gray) King & H. E. Robinson. Perennial; scrub grassland and encinal. *1504, 1522, 2012*

Ageratina paupercula (A. Gray) King & H. E. Robinson. Perennial; encinal in Ash Canyon. *SC 1052*

Ageratina thyrsiflora (Greene) King & H. E. Robinson. Perennial; rocky slope in scrub grassland in Grosvenor Hills. *3900, 3911*

Aldama cordifolia (A. Gray) E. E. Schilling & Panero [*Viguiera cordifolia* A. Gray. See Schilling & Panero 2011]. Perennial; slopes and seasonal drainages in encinal. *SC 674, SC 688, 1501*

Amauriopsis dissecta Rydberg. Perennial; encinal in Viceroy Mine Canyon. *1512*

Ambrosia confertiflora de Candolle. Perennial; scrub grassland and encinal. *SC 192, 3053*

Ambrosia monogyra (Torrey & A. Gray) Strother & B. G. Baldwin. Shrub; level, sandy drainages in scrub grassland. *SC 245, 3504*

Artemisia dracunculus Linnaeus. Perennial; scrub grassland and encinal. *SC 630, 1494*

Artemisia ludoviciana Nuttall subsp. *ludoviciana*. Perennial; scrub grassland and encinal. *SC 237, 3530*

Artemisia ludoviciana subsp. *mexicana* (Willdenow ex Sprengel) D. D. Keck. Perennial; rocky drainages in scrub grassland. *1487, 3567*

Baccharis pteronioides de Candolle. Shrub; slopes in scrub grassland. *SC 480, SC 1193*

Baccharis salicifolia (Ruiz & Pavón) Persoon. Shrub; seasonal drainages in scrub grassland. *SC 612, 3290*

Baccharis sarothroides A. Gray. Shrub; scrub grassland, often in disturbed areas. *SC 878, 3506, 3507*

Baccharis thesioides Kunth. Shrub; scrub grassland and encinal. *SC 240, 1493; Koopman 1*

Bahia absinthifolia Bentham. Perennial; calcareous soils in scrub grassland. *SC 49, 1900, 3698*

Baileya multiradiata Harvey & A. Gray. Perennial; gravelly soil and road margins in scrub grassland. *SC 351, 3044*

Bebbia juncea (Bentham) Greene var. *aspera* Greene. Shrub; open, rocky ground in scrub grassland. *SC 21, 1988*

Bidens aurea (Aiton) Sherff. Perennial; seasonal drainages in scrub grassland and encinal. *SC 214, 3797*

Bidens bigelovii A. Gray. Summer annual; scrub grassland. *SC 166*

Bidens heterosperma A. Gray. Summer annual; encinal in Viceroy Mine Canyon. *3361*

Bidens leptocephala Sherff. Summer annual; scrub grassland and encinal. *SC 183*

Bidens pilosa Linnaeus. Summer annual; scrub grassland and encinal. *1490, 1511*

Brickellia amplexicaulis B. L. Robinson. Perennial; rocky slopes and seasonal drainages in encinal. *SC 725, 3472*

Brickellia baccharidea A. Gray. Shrub; rocky slopes in scrub grassland. *3557, 3565*

Brickellia betonicifolia A. Gray. Perennial; rocky slopes in encinal. *SC 673, 1499*

Brickellia californica (Torrey & A. Gray) A. Gray. Shrub; rocky slopes in scrub grassland and encinal. *SC 684, 3916*

Brickellia coulteri A. Gray var. *brachiata* (A. Gray) B. L. Turner. Subshrub; rocky slopes and drainages in scrub grassland. *SC 321, 3052, 3552*

Brickellia eupatorioides (Linnaeus) Shinners var. *chlorolepis* (Wooton & Standley) B. L. Turner. Perennial; encinal in Viceroy Mine Canyon. *SC 685, 2014*

Brickellia floribunda A. Gray. Perennial; rocky and sandy drainages in scrub grassland and encinal. *SC 244, 3476*

Brickellia venosa (Wooton & Standley) B. L. Robinson. Subshrub; rock clefts along drainages in scrub grassland. *SC 222, SC 888, 2759*
Calycoseris wrightii A. Gray. Spring annual; sandy soil in scrub grassland. *SC 2, SC 3, 3002*
Carminatia tenuiflora de Candolle. Spring annual; shaded slopes in scrub grassland and encinal. *SC 234, 1484, 2010*
Carphochaete bigelovii A. Gray. Perennial; rocky slopes in encinal. *SC 296, 3729*
Chaetopappa ericoides (Torrey) G. L. Nesom. Perennial; calcareous and rocky soil in scrub grassland. *SC 366, 3042*
Cirsium neomexicanum A. Gray. Biennial; scrub grassland and encinal. *SC 445*
Coreocarpus arizonicus (A. Gray) Blake. Perennial; rocky drainages and cliff bases in encinal. *SC 231, 1482*
Cosmos parviflorus (Jacquin) Persoon. Summer annual; canyon bottoms and ridgetops in encinal. *SC 689*
Diaperia verna (Rafinesque) Morefield. Spring annual; gravelly and sandy soil in scrub grassland. *SC 387, 3658, 3679*
Dyssodia papposa (Ventenat) Hitchcock. Summer annual; disturbed ground in oak woodland. *3915*
Encelia farinosa A. Gray ex Torrey. Subshrub; rocky, south-facing slopes in scrub grassland. *SC 1103, 3700*
Ericameria cuneata (A. Gray) McClatchie var. *spathulata* (A. Gray) H. M. Hall. Shrub; one plant on north-facing cliff in encinal in Grosvenor Hills. *SC 1038* (SEINet)
Ericameria laricifolia (A. Gray) Shinners. Shrub; rocky slopes and flats in scrub grassland and encinal. *SC 400, 3561*
Erigeron arisolius G. L. Nesom. Summer annual; level ground in scrub grassland; flowers pale lavender to dark purple. *SC 561, SC 579, SC 917, 1225, 1902, 1958; Licher 5732* (ASC)
Erigeron canadensis Linnaeus [*Conyza canadensis* (Linnaeus) Cronquist]. Summer annual; drainages in scrub grassland. *SC 215, SC 667*
Erigeron divergens Torrey & A. Gray. Biennial; scrub grassland. *SC 7, SC 1087*
Erigeron incomptus A. Gray [*E. accedens* Greene]. Perennial; scrub grassland. *SC 86*
Erigeron neomexicanus A. Gray. Perennial; rocky slopes in scrub grassland and encinal. *SC 591*
Erigeron sceptrifer G. L. Nesom. Summer annual; open areas in scrub grassland. *SC 533, SC 560, 1507, 2023*
Erigeron tracyi Greene. Biennial; slopes in scrub grassland and encinal. *SC 1183*
Eriophyllum lanosum (A. Gray) A. Gray. Spring annual; gravelly soil in scrub grassland. *SC 352*
Fleischmannia sonorae (A. Gray) King & H. E. Robinson [*Eupatorium sonorae* A. Gray]. Perennial; drainages in scrub grassland and encinal. *SC 255, SC 686, SC 886, 2756, 3488, 3544*
Gaillardia pinnatifida Torrey. Perennial; scrub grassland. *SC 91, 3735*
Galinsoga parviflora Cavanilles var. *semicalva* A. Gray. Summer annual; small population along north-facing cliff in Grosvenor Hills. *SC 662*
Gamochaeta stagnalis (I. M. Johnston) Anderberg. Spring annual; scrub grassland. *2928, 3015, 3063, 3630*
Guardiola platyphylla A. Gray. Shrub; scrub grassland and encinal. *SC 282*
Gutierrezia microcephala (de Candolle) A. Gray. Subshrub; disturbed ground in scrub grassland. *SC 184*
Helenium thurberi A. Gray. Summer annual; rocky drainages in scrub grassland and encinal. *SC 471, SC 1168, 3545*
Helianthus petiolaris Nuttall. Summer annual; open areas and seasonal drainages in scrub grassland. *SC 544, SC 633*
Heliomeris longifolia (B. L. Robinson & Greenman) Cockerell var. *annua* (M. E. Jones) Yates. Summer annual; scrub grassland, especially rocky slopes. *SC 243, 3493*
Heliomeris multiflora Nuttall. Perennial; encinal and north-facing slopes in encinal. *1363, 1500*
Heterosperma pinnatum Cavanilles. Summer annual; scrub grassland and encinal. *SC 156, 3917*
Heterotheca fulcrata (Greene) Shinners var. *senilis* (Wooton & Standley) Semple. Perennial; encinal in Alto Gulch. *3531*
Heterotheca subaxillaris (Lamarck) Britton & Rusby subsp. *latifolia* (Buckley) Semple. Summer annual; roadsides in scrub grassland. *SC 669*
Hymenothrix wislizeni A. Gray. Summer annual; roadsides in scrub grassland. *SC 143*
Hymenothrix wrightii A. Gray. Perennial; rocky ground in scrub grassland and encinal. *SC 242, 2004, 2063*
Isocoma tenuisecta Greene. Subshrub; gravelly soils in scrub grassland. *SC 587, 2137*
Koanophyllon palmeri (Gray) R. M. King & H. Robinson. Perennial; rocky slopes in Fresno and Josephine canyons. *1381, 3931*
**Lactuca serriola* Linnaeus. Summer annual; seasonal drainages and springs in scrub grassland. *1208, 1265*

Laennecia coulteri (A. Gray) G. L. Nesom. Summer annual; seasonal drainages in scrub grassland and encinal. *1359*

Laennecia sophiifolia (Kunth) G. L. Nesom. Summer annual; seasonal drainages in scrub grassland. *SC 668, 1957*

Lagascea decipiens Hemsley. Shrub; sunny rock slopes in Grosvenor Hills. *SC 188, 1959, 1993; Licher 5734* (ASC)

Lasianthaea podocephala (A. Gray) K. Becker. Perennial; scrub grassland and encinal. *SC 577, 2611*

Logfia filaginoides (Hooker & Arnott) Morefield [*Filago californica* Nuttall. *Logfia californica* (Nuttall) Holub]. Spring annual; rocky slopes and flats in scrub grassland. *SC 398, 3624, 3677*

Machaeranthera tagetina Greene. Summer annual; roadsides and other disturbed ground in scrub grassland. *SC 137, SC 666, 3564*

Machaeranthera tanacetifolia (Kunth) Nees. Summer annual; one plant in scrub grassland. *SC 697*

Malacothrix fendleri A. Gray. Spring annual; sandy, gravelly soils in scrub grassland. *SC 347, 2315*

Malacothrix glabrata (A. Gray) A. Gray. Spring annual; sandy soils and rock outcrops in scrub grassland. *SC 411, 2304*

Malacothrix stebbinsii W. S. Davis & P. H. Raven [*M. clevelandii* A. Gray var. *stebbinsii* (W. S. Davis & P. H. Raven) Cronquist. Spring annual; rocky ground in scrub grassland and encinal. *SC 4, 3674*

Melampodium longicorne A. Gray. Summer annual; scrub grassland. *SC 113, 3257*

Melampodium strigosum Stuessy. Summer annual; scrub grassland. *SC 126, 1360, 3292*

Packera neomexicana (A. Gray) W. A. Weber & A. Löve var. *neomexicana.* Perennial; encinal in Viceroy Mine Canyon. *SC 1195*

Parthenice mollis A. Gray. Summer annual; rocky slopes in scrub grassland and encinal. *SC 65, 3478*

Pectis cylindrica (Fernald) Rydberg. Summer annual; level ground in scrub grassland. *SC 125*

Pectis filipes Harvey & A. Gray. Summer annual; scrub grassland and encinal. *SC 117, 3258*

Pectis longipes A. Gray. Perennial; scrub grassland. *SC 424, 2911*

Pectis prostrata Cavanilles. Summer annual; scrub grassland. *SC 109, 3289*

Porophyllum gracile Bentham. Perennial; south-facing rocky or calcareous slopes in scrub grassland. *SC 346, 3022*

Porophyllum ruderale (Jacquin) Cassini var. *macrocephalum* (de Candolle) Cronquist. Summer annual; rocky slopes in scrub grassland and encinal. *SC 182, 2686*

Pseudognaphalium canescens (de Candolle) Anderberg. Perennial; rocky slopes in scrub grassland and encinal. *SC 207, 3502, 3918*

Pseudognaphalium leucocephalum (A. Gray) Anderberg. Biennial; seasonal drainages in scrub grassland. *SC 213, 1486, 1963*

**Pseudognaphalium luteoalbum* (Linnaeus) Hilliard & Burtt. Spring annual; margins of cattle ponds in scrub grassland. *SC 420*

Pseudognaphalium stramineum (Kunth) W. A. Weber. Spring annual; cattle ponds and seasonally wet areas in scrub grassland. *SC 343, SC 1053*

Rafinesquia californica Nuttall. Spring annual; steep, north-facing rocky slope in encinal in Grosvenor Hills. *3765*

Rafinesquia neomexicana A. Gray. Spring annual; rocky slopes in scrub grassland. *SC 17, SC 316, 2385*

Roldana hartwegii (Bentham) H. E. Robinson & Brettell [*Senecio carlomasonii* B. L. Turner & T. M. Barkley]. Perennial; one plant at base of cliff in encinal in Grosvenor Hills. *SC 676*

Sanvitalia abertii A. Gray. Summer annual; scrub grassland and encinal. *SC 108, 1506*

Schkuhria pinnata (Lamarck) Kuntze ex Thellung. Summer annual; scrub grassland and encinal. *SC 167, 1939*

Senecio flaccidus Lessing var. *flaccidus.* Shrub; localized in level scrub grassland near ranch headquarters. *SC 515*

Solidago velutina de Candolle. Perennial; rocky ground in scrub grassland and encinal. *SC 230, 2123*

**Sonchus asper* (Linnaeus) Hill. Non-seasonal annual; scrub grassland. *SC 1043, SC 1172, 3755*

**Sonchus oleraceus* Linnaeus. Non-seasonal annual; scrub grassland. *SC 382, SC 1201, 3692*

Stephanomeria pauciflora (Torrey) A. Nelson. Subshrub; rocky, west-facing slope in scrub grassland. *2644*

Stephanomeria tenuifolia (Rafinesque) Hall. Perennial; scrub grassland and encinal. *SC 35, SC 53, SC 547*

Stephanomeria thurberi A. Gray. Summer annual; in shade of *Fraxinus velutina* along seasonal drainage in scrub grassland. *SC 37*

Stevia micrantha Lagasca. Summer annual; encinal in Alto Gulch and Viceroy Mine Canyon. *1523, 3529*

Stevia serrata Cavanilles. Perennial; entering study area in encinal in Viceroy Mine Canyon. *3365*

Symphyotrichum subulatum (Michaux) G. L. Nesom var. *parviflorum* (Nees) S.D. Sundberg. Annual or short-lived perennial; Tejano Spring and margins of cattle ponds. *SC 248, SC 726*
Tagetes micrantha Cavanilles. Summer annual; seasonal drainages and rocky slopes in encinal. *SC 118, 3363*
**Taraxacum officinale* F. H. Wiggers. Perennial; disturbed ground at ranch headquarters. *SC 427*
Thelesperma megapotamicum (Sprengel) Kuntze. Perennial; rocky ground in scrub grassland. *SC 507, 1903*
Thymophylla concinna (A. Gray) Strother. Spring annual; open, rocky slopes in scrub grassland. *SC 30, SC 31, 3697*
Thymophylla pentachaeta (de Candolle) Small var. *belenidium* (de Candolle) Strother. Perennial; calcareous soils in scrub grassland. *SC 479, 3288*
Tithonia thurberi A. Gray. Summer annual; shady seasonal drainages in scrub grassland. *SC 157, 3274*
Trixis californica Kellogg var. *californica.* Subshrub; rocky slopes and drainages in scrub grassland and encinal. *SC 219, 2136*
Uropappus lindleyi (de Candolle) Nuttall. Spring annual; rocky ground in scrub grassland and encinal. *SC 319, 3043, 3664, 3682*
Verbesina encelioides (Cavanilles) Bentham & Hooker f. ex A. Gray. Summer annual; seasonal drainages in scrub grassland and encinal. *3249, 3297*
Verbesina longifolia (A. Gray) A. Gray). Perennial; localized on steep, north-facing slope in encinal in Alto Gulch. *3536*
Viguiera dentata (Cavanilles) Sprengel var. *dentata.* Perennial; slopes in encinal. *SC 629*
Viguiera dentata var. *lancifolia* Blake. Perennial; rocky slopes and road margins in scrub grassland and encinal. *SC 232, SC 722*
Xanthisma gracile (Nuttall) D. R. Morgan & R. L. Hartman. Summer annual; sandy, gravelly soil in scrub grassland and encinal. *SC 211, 2695*
Xanthisma spinulosum (Pursh) D. R. Morgan & R. L. Hartman. Subshrub; one plant in disturbed ground in scrub grassland. *SC 880*
Xanthium strumarium Linnaeus. Summer annual; seasonal drainages in scrub grassland. *SC 615*
Xanthocephalum gymnospermoides (A. Gray) Bentham & Hooker f. Summer annual; floodplain of large cattle tank in scrub grassland. *1509*
Zinnia acerosa (de Candolle) A. Gray. Subshrub; calcareous soils in scrub grassland. *SC 45, 2553*
Zinnia peruviana (Linnaeus) Linnaeus. Summer annual; encinal in Alto Gulch and Viceroy Mine Canyon. *SC 238, 2005*

BERBERIDACEAE
Berberis wilcoxii Kearney. Shrub; base of north-facing talus slope along Bond Canyon, near west margin of study area. *3620*

BIGNONIACEAE
Chilopsis linearis (Cavanilles) Sweet subsp. *arcuata* (Fosberg) Henrickson. Tree; small population in Hangmans Canyon in southeast corner of study area. *3034, 3098*
Tecoma stans (Linnaeus) Jussieu ex Kunth var. *angustata* Rehder. Shrub; south-facing rocky slopes in scrub grassland. *SC 218, 1242*

BORAGINACEAE (see also HELIOTROPIACEAE, HYDROPHYLLACEAE, and NAMACEAE; Luebert et al. 2016)
Amsinckia intermedia Fischer & C.A. Meyer. Spring annual; floodplain and on slopes along lower Bond Canyon. *3618*
Cryptantha barbigera (A. Gray) Greene. Spring annual; scrub grassland. *SC 390, 2347*
Cryptantha pterocarya (Torrey) Greene. Spring annual; rocky ground scrub grassland. *SC 313, 2346, 2897*
Eremocarya micrantha (Torrey) Greene [*Cryptantha micrantha* (Torrey) I. M. Johnston]. Spring annual; sandy soil in scrub grassland. *3628, 3651, 3690*
Johnstonella angustifolia (Torrey) Hasenstab & M.G. Simpson [*Cryptantha angustifolia* (Torrey) Greene]. Spring annual; gravelly soil in scrub grassland. *2925, 3020, 3661*
Johnstonella pusilla (Torrey & A. Gray) Hasenstab & M.G. Simpson [*Cryptantha pusilla* (Torrey & A. Gray) Greene]. Spring annual; sandy, gravelly soil in scrub grassland. *3696, 3722*
Lappula occidentalis (S. Watson) Greene. Spring annual; gravelly soil and seasonal drainages in scrub grassland. *SC 373, 3653*

Pectocarya heterocarpa (I. M. Johnston) I. M. Johnston. Spring annual; scrub grassland. *2918, 2929, 3660*
Pectocarya platycarpa (Munz & Johnston) Munz & Johnston. Spring annual; scrub grassland. *2922*
Pectocarya recurvata I. M. Johnston. Spring annual; scrub grassland. *SC 288, 2303, 2927*
Plagiobothrys arizonicus (A. Gray) Greene ex A. Gray. Spring annual; scrub grassland. *SC 305, SC 1079, 3662*

BRASSICACEAE

Boechera perennans (S. Watson) W. A. Weber [*Arabis perennans* S. Watson]. Perennial; rock clefts in scrub grassland and encinal. *SC 307, 3581*
**Brassica tournefortii* Gouan. Spring annual; a single plant on disturbed ground at ranch headquarters, vouchered and removed. *SC 1041*
**Capsella bursa-pastoris* (Linnaeus) Medikus. Spring annual; disturbed ground in scrub grassland at ranch headquarters. *SC 326*
Caulanthus lasiophyllus (Hooker & Arnott) Payson. Spring annual; south-facing rocky slope in scrub grassland. *4095*
**Chorispora tenella* (Pallas) de Candolle. Spring annual; Tejano Spring. *SC 1*
Descurainia pinnata (Walter) Britton. Spring annual; scrub grassland. *SC 284, SC 1057, 2895*
**Descurainia sophia* (Linnaeus) Webb ex Prantl. Spring annual; disturbed ground in scrub grassland. *2956*
Dryopetalon runcinatum A. Gray. Perennial; rocky slopes in partial shade in scrub grassland. *SC 320, 2944*
Hesperidanthus linearifolius (A. Gray) Rydberg [*Schoenocrambe linearifolia* (A. Gray) Rollins]. Perennial; scrub grassland and encinal. *SC 96, 2551*
Lepidium oblongum Small. Spring annual; level ground in scrub grassland and encinal. *SC 295, 2230, 2307*
Lepidium thurberi Wooton. Non-seasonal annual; disturbed ground in scrub grassland. *SC 280, SC 558, 3756*
Lepidium virginicum Linnaeus. Spring annual; slopes, flats, and seasonal drainages in scrub grassland. *SC 379, SC 956, SC 1075*
**Nasturtium officinale* Aiton. Aquatic perennial; near-permanent drainages and at Tejano Spring. *SC 417, SC 1091*
Pennellia micrantha (A. Gray) Nieuwland. Perennial; canyons and rocky slopes in scrub grassland and encinal. *SC 604, 1231*
Physaria gordonii (A. Gray) O'Kane & Al-Shehbaz [*Lesquerella gordonii* (A. Gray) S. Watson]. Spring annual; sandy washes and west-facing slopes in scrub grassland. *SC 337, 3617, 3678*
**Sisymbrium irio* Linnaeus. Spring annual; cattilated areas in scrub grassland. *SC 281, SC 1058*
Streptanthus carinatus C. Wright ex A. Gray subsp. *arizonicus* (S. Watson) Kruckeberg, Rodman & Worthington. Spring annual; south-facing rocky slopes at south end of Grosvenor Hills. *4101*
Thysanocarpus curvipes Hooker. Spring annual; rocky slopes and drainages in scrub grassland. *SC 283, SC 317, 2896*
Tomostima cuneifolia (Nuttall ex Torrey & A. Gray) Al-Shehbaz et al. [*Draba cuneifolia* Nuttall ex Torrey & A. Gray. *D. cuneifolia* var. *sonorae* (Greene) Parish. See Al-Shehbaz 2012]. Spring annual; rocky slopes and seasonal drainages in scrub grassland. *SC 959, 3586*

CACTACEAE

Carnegiea gigantea (Engelmann) Britton & Rose. Tree; two plants, 2 m and 4 m tall, on south-facing slopes in scrub grassland. *SC 508*
Coryphantha vivipara (Nuttall) Britton & Rose var. *bisbeeana* (Orcutt) L. Benson. Perennial; gravelly soil in scrub grassland. *SC 545*
Cylindropuntia fulgida (Engelmann) Knuth var. *fulgida*. Perennial; scrub grassland near west boundary of study area. *2505*
Cylindropuntia fulgida var. *mamillata* (Schott) Backeberg. Perennial; scrub grassland near west boundary of study area. *SC 530*
Cylindropuntia spinosior (Engelmann) Knuth. Shrub; scrub grassland and encinal, usually on level ground. *SC 483, SC 1173*
Echinocereus fendleri (Engelmann) Sencke ex J. N. Haage. Perennial; scrub grassland, usually on level ground. *SC 455, 3056*
Echinocereus rigidissimus (Engelmann) Engelmann ex Haage var. *rigidissimus*. Perennial; in scrub grassland and encinal, usually in rock crevices. *SC 496, 2519*
Echinocereus santaritensis W. Blum & Rutow. Perennial; clusters of few to many stems on rock ledges in encinal. *SC 491*

Ferocactus wislizeni (Engelmann) Britton & Rose. Perennial; rocky ground in scrub grassland and encinal. *SC 576*
Mammillaria grahamii Engelmann. Perennial; rock outcrops in scrub grassland. *1236*
Mammillaria macdougalii Rose. Perennial; rocky ground in scrub grassland. *SC 437*
Mammillaria wrightii Engelmann var. *wilcoxii* (Toumey ex K. Schumann) W. T. Marshall. Perennial; north-facing slopes in scrub grassland and encinal. *SC 1216, SC 1220* (SEINet), *1222*
Opuntia chlorotica Engelmann & Bigelow. Shrub; scrub grassland and encinal. *SC 1209*
Opuntia engelmannii Salm-Dyck ex Engelmann var. *engelmannii*. Shrub; scrub grassland and encinal. *SC 501, SC 506*
Opuntia engelmannii var. *laevis* (J. M. Coulter) Felger, Verrier & Carnahan [*O. laevis* J. M. Coulter. *O. phaeacantha* var. *laevis* (J. M. Coulter) L. D. Benson. See Felger et al. 2017b]. Shrub; on cliffs out of reach of cattle near Tejano Spring in Grosvenor Hills. *SC 652* (SEINet)
Opuntia phaeacantha Engelmann. Shrub; one plant in level scrub grassland near east margin of study area. *2512*
Opuntia santarita (Griffiths & Hare) Rose [*O. chlorotica* Engelmann & J. M. Bigelow var. *santarita* Griffiths & Hare; possible type locality—see text. *O. gosseliniana* F. A. C. Weber var. *santarita* (Griffiths & Hare) L. D. Benson. *O. violacea* Engelmann ex B. D. Jackson var. *santarita* (Griffiths & Hare) L. D. Benson]. Shrub; south-facing rocky slopes in scrub grassland. *SC 485, SC 1202*

CAMPANULACEAE
Lobelia fenestralis Cavanilles. Summer annual; seasonally wet swales in encinal in Grosvenor Hills. *SC 578, 3936*
Triodanis biflora (Ruiz & Pavón) Greene [*Triodanis perfoliata* (Linnaeus) Nieuwland var. *biflora* (Ruiz & Pavón) T.R. Bradley]. Spring annual; seasonal drainages in scrub grassland. *SC 459, 3759*
Triodanis holzingeri McVaugh. Spring annual; seasonal drainages in scrub grassland. *SC 458, SC 1180, 3740*

CANNABACEAE
Celtis pallida Torrey var. *pallida.* Shrub; rocky slopes in scrub grassland. *2124*
Celtis reticulata Torrey. Tree; seasonal drainages and rocky slopes in scrub grassland. *SC 435, 2133*

CAPRIFOLIACEAE
Valeriana sorbifolia Kunth. Perennial; encinal along Viceroy Mine Canyon. *SC 690*

CARYOPHYLLACEAE
Cerastium texanum Britton. Non-seasonal annual; scrub grassland and encinal. *SC 297, 3613*
Drymaria depressa Greene [*D. effusa* A. Gray var. *depressa* (Greene) J. A. Duke]. Summer annual; encinal. *3362*
Drymaria glandulosa K. Presl. Summer annual; scrub grassland and encinal. *SC 658, 1991, 3534*
Drymaria molluginea (Lagasca) Didrichsen. Summer annual; scrub grassland. *SC 593*
**Herniaria hirsuta* Linnaeus var. *cinerea* (de Candolle) Loret & Barrandon. Spring annual; disturbed ground and seasonal drainage near ranch headquarters. *SC 385, 3757*
Loeflingia squarrosa Nuttall. Spring annual; sandy soil along seasonal drainages in scrub grassland. *3631, 3654, 3710*
Silene antirrhina Linnaeus. Spring annual; scrub grassland and encinal. *SC 439, 3065*
Silene laciniata Cavanilles. Perennial; encinal in Alto Gulch and Viceroy Mine Canyon. *1525, 3537*

CLEOMACEAE
Polanisia dodecandra (Linnaeus) de Candolle subsp. *trachysperma* (Torrey & A. Gray) Iltis. Summer annual; sandy drainages and disturbed sites in scrub grassland. *SC 52*

COCHLOSPERMACEAE
Amoreuxia palmatifida de Candolle. Perennial; rocky slopes in scrub grassland. *SC 42, 1898*

COMANDRACEAE
Comandra umbellata (Linnaeus) Nuttall. Perennial; rocky slopes in encinal. *SC 15*

CONVOLVULACEAE
Convolvulus equitans Bentham. Perennial vine; rocky, calcareous soils in scrub grassland. *SC 221, 2302*

Cuscuta chinensis Lamarck var. *applanata* (Engelmann) Costea & Stefanović [*C. applanata* Engelmann]. Perennial vine; encinal in Santa Rita foothills, on *Coreocarpus arizonicus. 3430*
Cuscuta erosa Yuncker. Summer annual; on *Boerhavia* and *Ipomoea* in scrub grassland. *SC 106, SC 195, 3924*
Evolvulus alsinoides (Linnaeus) Linnaeus. Perennial; south-facing rocky slopes in scrub grassland. *SC 322, 3222, 3554*
Evolvulus arizonicus A. Gray. Perennial; scrub grassland and encinal. *SC 57, 2323*
Evolvulus nuttallianus Roemer & Schultes. Perennial; calcareous soils in scrub grassland. *SC 566, 3737*
Evolvulus sericeus Swartz. Perennial; gravelly soil in scrub grassland and encinal. *SC 456, 2322*
Ipomoea barbatisepala A. Gray. Summer annual vine; rocky slopes in scrub grassland. *SC 150, 2669*
Ipomoea capillacea (Kunth) G. Don. Perennial; rocky, often north-facing, slopes in scrub grassland. *SC 588, 3256*
Ipomoea costellata Torrey. Summer annual vine; scrub grassland and encinal. *SC 163, 2684*
Ipomoea cristulata Hallier f. Summer annual vine; scrub grassland and encinal. *SC 142, 2670*
**Ipomoea hederacea* Jacquin. Summer annual vine; scrub grassland and encinal. *SC 130, 2604*
Ipomoea muricata (L.) Jacquin. Summer annual vine; two plants in sand along Josephine Canyon. New for Arizona. *3933*
Ipomoea ternifolia Cavanilles var. *leptotoma* (Torrey) J. A. McDonald. Summer annual vine; rocky slopes and seasonal drainages in scrub grassland. *SC 103, 3923*
Ipomoea thurberi A. Gray. Perennial vine; gentle, south-facing rocky slopes in scrub grassland. *SC 100, 1970*

CRASSULACEAE
Crassula connata (Ruiz & Pavón) Berger. Summer annual; seasonal drainage in scrub grassland. *2930*
Graptopetalum bartramii Rose. Perennial; rock crevices in encinal along Viceroy Mine Canyon. *SC 540* (SEINet), *SC 543*
Sedum cockerellii Britton. Perennial; vertical rock faces on Grosvenor Cliffs and along canyons. *SC 681*

CUCURBITACEAE
Apodanthera undulata A. Gray. Perennial vine; swales and gentle slopes in scrub grassland and encinal. *SC 550, 1981*
Cucurbita digitata A. Gray. Perennial vine; scrub grassland and encinal. *SC 535*
Cucurbita foetidissima Kunth. Perennial vine; encinal. *SC 1205*
Echinopepon wrightii (A. Gray) S. Watson. Summer annual vine; drainages in scrub grassland. *SC 138, 3294, 3486*
Marah gilensis (Greene) Greene. Perennial; rocky, northwest-facing slope along Bond and Josephine canyons. *3619, 3625*
Sicyosperma gracile A. Gray. Summer annual vine; scrub grassland in Grosvenor Hills and Cieneguita Canyon. *1483, 3516*

ERICACEAE
Arctostaphylos pungens Kunth. Shrub; rocky slopes in encinal. *SC 303, 3571*

EUPHORBIACEAE
Acalypha neomexicana Müller Argoviensis. Summer annual; scrub grassland and encinal. *SC 596, 1496*
Acalypha ostryifolia Riddell ex J. M. Coulter. Summer annual; scrub grassland. *1382, 1904*
Argythamnia serrata (Torrey) Müller Argoviensis [*A. neomexicana* Müller Argoviensis. *Ditaxis neomexicana* (Müller Argoviensis) A. Heller. *D. serrata* (Torrey) A. Heller]. Perennial; scrub grassland. *SC 367, 1371*
Cnidoscolus angustidens Torrey. Perennial; rocky slopes in scrub grassland and encinal. *SC 41*
Croton ciliatoglandulifer Ortega. Shrub; Fresno Canyon near south boundary of study area. *SC 452, SC 1072*
Croton pottsii (Klotzsch) Müller Argoviensis var. *pottsii*. Perennial; calcareous soils in scrub grassland. *SC 46, 3086*
Euphorbia albomarginata Torrey & A. Gray. Perennial; scrub grassland. *SC 383, 3283*
Euphorbia arizonica Engelmann. Summer annual; rocky slopes in scrub grassland. *SC 642, 3556*
Euphorbia bilobata Engelmann. Summer annual; encinal in Viceroy Mine Canyon. *3364*
Euphorbia capitellata Engelmann. Perennial; scrub grassland and encinal. *SC 546*
Euphorbia cuphosperma (Engelmann) Boissier. Summer annual; encinal. *1897*
Euphorbia exstipulata Engelmann. Summer annual; road margins in scrub grassland. *SC 224, 2672*
Euphorbia florida Engelmann. Summer annual; scrub grassland. *SC 635, 3291*

Euphorbia heterophylla Linnaeus. Summer annual; scrub grassland and encinal. *SC 112, SC 617, 1357, 1497*
Euphorbia hirta Linnaeus. Summer annual; scrub grassland. *SC 212, 3260*
Euphorbia hyssopifolia Linnaeus. Summer annual; scrub grassland. *SC 597, 2607*
Euphorbia indivisa (Engelmann) Tidestrom. Summer annual; scrub grassland and encinal. *SC 176, 2689, 3259*
Euphorbia micromera Boissier. Summer annual; scrub grassland. *1271*
Euphorbia pediculifera Engelmann var. *pediculifera*. Perennial; scrub grassland and encinal. *SC 890, 3769*
Euphorbia prostrata Aiton. Non-seasonal annual; scrub grassland. *SC 717, 3811*
Euphorbia revoluta Engelmann. Summer annual; sandy, gravelly soil in scrub grassland. *SC 728, 3897*
Euphorbia serpillifolia Persoon. Summer annual; scrub grassland. *1270, 3286*
Euphorbia setiloba Engelmann. Summer annual; scrub grassland. *3901*
Jatropha macrorhiza Bentham. Perennial; scrub grassland and encinal. *SC 56, 2526, 2548*
Manihot angustiloba (Torrey) Müller Argoviensis. Perennial; rocky slopes and boulder outcrops in scrub grassland. *SC 44, 1380, 1901, 2550, 3221*
Manihot davisiae Croizat. Perennial; scrub grassland near lower Bond Canyon and rocky slope in Grosvenor Hills. *1269, 3882*
Tragia laciniata (Torrey) Müller Argoviensis. Perennial; north-facing slopes in scrub grassland and encinal. *SC 916, SC 1215, 1972*
Tragia nepetifolia Cavanilles. Perennial; rocky drainages in scrub grassland and encinal. *SC 312, 2900*

FABACEAE

Acaciella angustissima (Miller) Britton & Rose [*Acacia angustissima* (Miller) Kuntze]. Perennial; slopes in scrub grassland and encinal. *SC 502*
Acmispon brachycarpus (Bentham) D. D. Sokoloff [*Lotus humistratus* Greene]. Annual; scrub grassland. *SC 364, 2305*
Acmispon greenei (Wooton & Standley) Brouillet [*Lotus greenei* (Wooton & Standley) Ottley]. Perennial; scrub grassland and encinal. *SC 397, 2387, 3663*
Acmispon oroboides (Kunth) Brouillet. Perennial; encinal. *SC 603, 3369*
Amorpha fruticosa Linnaeus. Perennial; rocky drainages in scrub grassland and encinal. *SC 470, 3747*
Astragalus allochrous A. Gray. Perennial; level, sandy soil in scrub grassland. *SC 418, 3652, 3711*
Astragalus arizonicus A. Gray. Perennial; calcareous soils in scrub grassland. *SC 369, 2390*
Astragalus nothoxys A. Gray. Perennial; scrub grassland and encinal. *SC 378, SC 1084*
Astragalus nuttallianus de Candolle. Spring annual; scrub grassland and encinal. *SC 329, 2920*
Calliandra eriophylla Bentham. Subshrub; rocky slopes in scrub grassland. *SC 363, 3665*
Calliandra humilis Bentham var. *humilis*. Subshrub; encinal in Grosvenor Hills and Santa Rita foothills. *3237*
Calliandra humilis var. *reticulata* (A. Gray) L. Benson. Subshrub; encinal in Viceroy Mine Canyon. *2758*
Chamaecrista nictitans (Linnaeus) Moench var. *leptadenia* (Greenman) Gandhi & S. L. Hatch [*C. nictitans* var. *mensalis* (Greenman) H. S. Irwin & Barneby]. Summer annual; scrub grassland and encinal. *SC 114, 1941, 3261*
Chamaecrista serpens (Linnaeus) Greene var. *wrightii* (A. Gray) H. S. Irwin & Barneby. Perennial; decomposed granite slopes in encinal in Viceroy Mine Canyon. *3360*
Cologania angustifolia Kunth. Perennial; scrub grassland and encinal. *SC 602*
Coursetia caribaea (Jacquin) Lavin var. *sericea* (A. Gray) Lavin. Perennial; scrub grassland and encinal. *SC 618, 1244*
Crotalaria pumila Ortega. Summer annual; scrub grassland. *SC 175, 2127*
Dalea albiflora A. Gray. Perennial; scrub grassland and encinal. *SC 236, 1495, 1498, 1942, 3480*
Dalea exigua Barneby. Summer annual; north slope in scrub grassland in Grosvenor Hills. *SC 678*
Dalea formosa Torrey. Shrub; calcareous soils in scrub grassland. *SC 1097, 3666*
Dalea grayi (Vail) L. L. Williams. Perennial; encinal along Viceroy Mine Canyon. *1517*
Dalea mollissima (Rydberg) Munz. Annual; small population in calcareous soil in scrub grassland. *3733*
Dalea nana Torrey ex A. Gray. Perennial; calcareous soils in scrub grassland. *SC 66, 3704*
Dalea pogonathera A. Gray. Perennial; rocky or calcareous soils in scrub grassland and encinal. *SC 89, 2353*
Dalea pringlei A. Gray. Perennial; rocky slopes in scrub grassland. *SC 180, 2936*
Dalea pulchra Gentry. Subshrub; gravelly, rocky soil in scrub grassland. *SC 289, 3050*
Dalea versicolor Zuccarini var. *sessilis* (A. Gray) Barneby. Subshrub; slopes and along drainages in scrub grassland and encinal. *SC 372, 3064*
Dalea wrightii A. Gray. Perennial; rocky, calcareous slopes in scrub grassland. *3760*

Desmanthus cooleyi (Eaton) Branner & Coville. Perennial; scrub grassland and encinal. *SC 58, 2613*
Desmodium batocaulon A. Gray. Perennial; encinal in Grosvenor Hills and Santa Rita foothills. *SC 631*
Desmodium cinerascens A. Gray. Perennial; encinal in Ash Canyon. *SC 918*
Desmodium grahamii A. Gray. Perennial; scrub grassland at south end of Grosvenor Hills. *1952*
Desmodium neomexicanum A. Gray. Summer annual; scrub grassland and encinal. *1960, 3296*
Desmodium psilocarpum A. Gray. Perennial; rocky slopes and along drainages in scrub grassland. *SC 107, 3922*
Desmodium retinens Schlechtendal. Perennial; encinal in Viceroy Mine Canyon. *2757*
Desmodium rosei B. G. Schubert. Summer annual; drainages and canyons in scrub grassland and encinal. *SC 178, 2011*
Erythrina flabelliformis Kearney. Shrub; rock outcrops and rocky slopes in scrub grassland. *SC 490, SC 531*
**Erythrostemon gilliesii* (Hooker) Klotzsch [*Caesalpinia gilliesii* (Hooker) D. Dietrich]. Shrub; small population in scrub grassland. *SC 29*
Eysenhardtia orthocarpa (A. Gray) W. Watson. Shrub; rocky slopes in scrub grassland and encinal. *SC 509, SC 539, 3813*
Galactia wrightii A. Gray. Perennial vine; scrub grassland and encinal. *SC 607*
Indigofera sphaerocarpa A. Gray. Shrub; encinal in Grosvenor Hills and Santa Rita foothills. *1905, 2013, 3433*
Lathyrus graminifolius (S. Watson) White. Perennial; encinal in Viceroy Mine Canyon. *1256*
Lupinus brevicaulis S. Watson. Spring annual; sandy, gravelly soils in scrub grassland. *3668*
Lupinus concinnus J. G. Agardh. Spring annual; rocky drainages in scrub grassland. *SC 331, 2345, 2910*
Lupinus sparsiflorus Bentham. Spring annual; scrub grassland. *SC 325, 2909*
Macroptilium gibbosifolium (Ortega) A. Delgado. Perennial; gravelly soil in scrub grassland and encinal. *SC 209*
Marina calycosa (A. Gray) Barneby. Perennial; calcareous soils in scrub grassland. *SC 350, 2389, 3057*
Mariosousa millefolia (S. Watson) Seigler & Ebinger [*Acacia millefolia* S. Watson]. Shrub; rocky slopes in scrub grassland in southwestern part of study area. *SC 199, 1239*
**Medicago polymorpha* Linnaeus. Spring annual; localized in disturbed scrub grassland at ranch headquarters. *SC 380*
**Melilotus indicus* (Linnaeus) Allioni. Summer annual; cattle ponds and Tejano Spring. *SC 428, SC 1074*
Mimosa aculeaticarpa Ortega var. *biuncifera* (Bentham) Barneby. Shrub; rocky slopes in scrub grassland and encinal. *SC 482, 3815*
Mimosa dysocarpa Bentham. Shrub; rocky slopes in scrub grassland and encinal. *SC 552, SC 1176*
Mimosa grahamii A. Gray var. *grahamii*. Shrub; Ash Canyon and tributaries in southeast part of study area. *2570*
Nissolia schottii (Torrey) A. Gray. Perennial vine; rocky drainages and slopes in scrub grassland and encinal. *SC 78, 2569*
Parkinsonia florida (Bentham ex A. Gray) S. Watson [*Cercidium floridum* Bentham ex A. Gray]. Tree; scrub grassland. *SC 433, SC 449*
Pediomelum tenuiflorum (Pursh) A. N. Egan [*Psoralidium tenuiflorum* (Pursh) Rydberg]. Perennial; rocky or gravelly soil in scrub grassland. *SC 24, SC 1189*
Phaseolus acutifolius A. Gray var. *acutifolius*. Annual; rocky slopes in scrub grassland and encinal. *SC 179, SC 677, 3896*
Phaseolus ritensis M. E. Jones. Perennial; rocky slopes in encinal. *SC 672*
Prosopis velutina Wooton [*P. juliflora* (Swartz) de Candolle var. *velutina* (Wooton) Sargent]. Tree; scrub grassland and exposed sites in encinal. *SC 461, SC 1166, 2139*
Rhynchosia edulis Grisebach. Perennial; scrub grassland and encinal. *SC 694, 1247, 1266, 1947, 1967, 3509, 3925*
Rhynchosia minima (Linnaeus) de Candolle. Perennial; scrub grassland in south part of study area. *SC 1071, SC 1143, 1949, 3282*
Rhynchosia senna Gillies ex Hooker & Arnott var. *texana* (Torrey & A. Gray) M. C. Johnston. Perennial; scrub grassland. *SC 696, 1969*
Senegalia greggii (A. Gray) Britton & Rose [*Acacia greggii* A. Gray]. Small tree; scrub grassland. *SC 498, 3812*
Senna bauhinioides (A. Gray) H. S. Irwin & Barneby. Perennial; gravelly soil in scrub grassland. *SC 48, 3223*
#*Senna covesii* (A. Gray) H. S. Irwin & Barneby. Perennial; introduced (seeded) in encinal near Alto Gulch during mine clean-up; not native to study area. *3085*
Senna hirsuta (Linnaeus) H. S. Irwin & Barneby var. *glaberrima* (M. E. Jones) H. S. Irwin & Barneby. Shrub; scrub grassland and encinal, especially along drainages. *SC 567*
Sphinctospermum constrictum (S. Watson) Rose. Summer annual; south-facing slopes in scrub grassland in Grosvenor Hills. *1953*

Tephrosia leiocarpa A. Gray. Shrub; rocky slopes in scrub grassland and encinal. *2105, 1355*
Tephrosia tenella A. Gray [*T. vicioides* Schlechtendal]. Perennial; rocky slopes in scrub grassland. *SC 220, SC 559, 2105, 3551*
Vachellia constricta (Bentham) Seigler & Ebinger [*Acacia constricta* Bentham]. Shrub-sized tree; south-facing slopes in scrub grassland. *SC 478*
Vicia ludoviciana Nuttall ex Torrey & A. Gray subsp. *ludoviciana* [*Vicia exigua* Nuttall]. Annual vine; slopes and seasonal drainages in scrub grassland. *SC 12, 2898, 3675*
Zornia reticulata Smith. Perennial; scrub grassland and encinal. *SC 598, 1944*

FAGACEAE
Quercus arizonica Sargent [perhaps not distinct from *Q. grisea* Liebmann]. Tree; above 5000 feet in encinal in Santa Rita foothills. *SC 541, 1502*
Quercus emoryi Torrey. Tree; scrub grassland and encinal, especially exposed slopes. *SC 536*
Quercus hypoleucoides A. Camus. Tree; encinal in Santa Rita foothills, also two trees at base of cliff in Grosvenor Hills. *SC 132*
Quercus oblongifolia Torrey. Tree; encinal, also localized on north-facing slopes in scrub grassland. *SC 538*
Quercus toumeyi Sargent. Shrub-sized tree; encinal on ridge northeast of Viceroy Mine Canyon. *SC 691, 3570*

FOUQUIERIACEAE
Fouquieria splendens Engelmann subsp. *splendens*. Shrub; rocky slopes and calcareous soils in scrub grassland and encinal. *SC 434, SC 468, SC 1177*

GARRYACEAE
Garrya wrightii Torrey. Shrub; encinal and narrow canyons in scrub grassland. *SC 208, 3919*

GENTIANACEAE
Zeltnera arizonica (A. Gray) G. Mansion [*Centaurium calycosum* (Buckley) Fernald var. *arizonicum* (A. Gray) Tidestrom]. Spring annual; seasonal drainages and Tejano Spring in scrub grassland. *SC 443, SC 1169, 3749*
Zeltnera nudicaulis (Engelmann) G. Mansion [*Centaurium nudicaule* (Engelmann) B. L. Robinson]. Spring annual; seasonal drainages in scrub grassland. *3743, 3750*

GERANIACEAE
**Erodium cicutarium* (Linnaeus) L'Héritier ex Aiton. Spring annual; gravelly soil in scrub grassland. *SC 287, 2914*
Erodium texanum A. Gray. Spring annual; rocky slopes and calcareous soils in scrub grassland. *SC 348, 3659*

HELIOTROPIACEAE
Euploca fruticosa (Linnaeus) J. I. M. Melo & Semir [*Heliotropium fruticosum* Linnaeus]. Summer annual; scrub grassland. *SC 110, SC 619, 2642, 3515*
Euploca procumbens (Miller) Diane & Hilger [*Heliotropium procumbens* Miller]. Summer annual; margins of cattle ponds in scrub grassland. *SC 28, SC 32, 1954, 2636*

HYDRANGEACEAE
Fendlera rupicola A. Gray. Shrub; steep, north-facing slopes in scrub grassland and encinal. *SC 358, 3681*
Philadelphus microphyllus A. Gray. Shrub; steep, north-facing slopes in encinal. *SC 519, 1261*

HYDROPHYLLACEAE
Eucrypta micrantha (Torrey) Heller. Spring annual; shade in scrub grassland. *SC 292, 2312, 2894, 2915*
Phacelia affinis A. Gray. Spring annual; rocky ground in scrub grassland. *SC 401, 2917, 2935, 3672*
Phacelia arizonica A. Gray. Spring annual; sandy, silty soil in scrub grassland. *SC 332, SC 1076, 2320, 2919; Harlan AH-03-27*
Phacelia bombycina Wooton & Standley. Spring annual; rocky slopes in scrub grassland. *SC 432, 2317*
Phacelia caerulea Greene. Spring annual; rocky slopes and seasonal drainages in scrub grassland. *SC 389, SC 450, 2316*
Phacelia distans Bentham. Spring annual; rocky slopes and flats in scrub grassland. *SC 472, SC 1066, 3048*

Phacelia sonoitensis S. P. McLaughlin. Spring annual; rocky slopes in scrub grassland. *SC 1144, 3018, 3060, 3673, 3763, 3767*

JUGLANDACEAE

Juglans major (Torrey) A. Heller. Tree; floodplain along seasonal drainages in scrub grassland. *SC 516*

KRAMERIACEAE

Krameria erecta Willdenow. Subshrub; rocky ground in scrub grassland. *SC 60, 3706, 3736*

Krameria lanceolata Torrey. Perennial; calcareous soils in scrub grassland. *SC 586, 3738*

LAMIACEAE

Clerodendrum coulteri A. Gray (Govaerts) [*Tetraclea coulteri* A. Gray]. Perennial; calcareous soils in scrub grassland. *SC 74, 3724*

Hedeoma dentata Torrey. Perennial; rocky slopes and seasonal drainages in scrub grassland and encinal. *SC 235, 1489, 1515*

**Lamium amplexicaule* Linnaeus. Spring annual; seasonal drainages in scrub grassland. *SC 384, 3796*

**Marrubium vulgare* Linnaeus. Perennial; old mine sites and rocky drainages in scrub grassland. *SC 1101, 3014*

Monarda citriodora Cervantes ex Lagasca subsp. *austromontana* (Epling) Scora. Summer annual; entering the study area in encinal in Viceroy Mine Canyon. *1258*

Salvia parryi A. Gray. Subshrub; scrub grassland and encinal. *SC 453, SC 1044, 3031, 3035, 3501*

Salvia subincisa Bentham. Annual; scrub grassland and encinal. *SC 70, 2916, 3514*

Stachys coccinea Ortega. Perennial; rocky slopes and seasonal drainages in scrub grassland and encinal. *SC 338*

Trichostema arizonicum A. Gray. Perennial; scrub grassland and encinal. *SC 94*

LINACEAE

Linum puberulum (Engelmann) A. Heller. Non-seasonal annual; scrub grassland. *SC 365, 3254*

**Linum usitatissimum* Linnaeus. Spring annual; scrub grassland along west margin of Grosvenor Hills. *SC 1069, 3671*

LOASACEAE

Mentzelia albicaulis (Douglas) Douglas ex Torrey & A. Gray. Spring annual; scrub grassland. *SC 293, 2908; Harlan AH-03-26*

Mentzelia aspera Linnaeus. Summer annual; seasonal drainages in scrub grassland. *SC 625*

Mentzelia isolata Gentry. Summer annual; scrub grassland. *SC 171, 2690*

LYTHRACEAE

Ammannia auriculata Willdenow. Summer annual; small population at cattle pond near Alamo Canyon. *3558, 3981*

Cuphea wrightii A. Gray. Summer annual; shaded slopes and drainages in scrub grassland and encinal. *SC 133, 1367*

Lythrum californicum Torrey & A. Gray. Perennial; seasonal drainages in scrub grassland and encinal. *SC 217, 3293*

**Punica granatum* Linnaeus. Shrub; historically planted and persisting at Salero Camp (ghost town). *3287*

MALPIGHIACEAE

Aspicarpa hirtella L. C. Richard. Perennial; north-facing, rocky slopes in scrub grassland. *SC 93*

Cottsia gracilis (A. Gray) W. R. Anderson [*Janusia gracilis* A. Gray]. Perennial vine; south-facing rocky and calcareous slopes in scrub grassland. *SC 121, 3699*

MALVACEAE

Abutilon abutiloides (Jacquin) Garcke ex Hochreutiner. Perennial; south-facing rocky slopes in scrub grassland. *SC 503, 2132, 3562*

Abutilon incanum (Link) Sweet. Subshrub; south-facing rocky slopes in scrub grassland. *SC 636*

Abutilon mollicomum (Willdenow) Sweet. Perennial; scrub grassland. *SC 568*

Abutilon parishii S. Watson. Perennial; rock crevices on slopes and along drainages in scrub grassland. *1358, 1378*

Abutilon reventum S. Watson. Perennial; south-facing rocky slopes in scrub grassland. *1243, 1983*
Anoda abutiloides A. Gray. Perennial; seasonal drainages in scrub grassland and encinal. *SC 460, 2122*
Anoda crenatiflora Ortega. Summer annual; small population in Josephine Canyon at western edge of study area. *3300*
Anoda cristata (Linnaeus) Schlechtendal. Summer annual; seasonal drainages and rocky slopes in scrub grassland and encinal. *SC 155, 3934*
Ayenia filiformis S. Watson. Perennial; open, rocky slopes and seasonal drainages in scrub grassland. *SC 101, 1982, 3553*
Gossypium thurberi Todaro. Shrub; rocky slopes and seasonal drainages in scrub grassland and encinal. *SC 181*
Herissantia crispa (Linnaeus) Brizicky. Perennial; south-facing rocky slopes and seasonal drainages in scrub grassland. *SC 77, 3703*
Hibiscus biseptus S. Watson. Perennial; rocky slopes and outcrops in scrub grassland. *SC 102, SC 122, 1241, 1968, 2668, 3892, 3894*
Hibiscus coulteri Harvey ex A. Gray. Perennial; south-facing rocky slopes and outcrops in scrub grassland. *SC 440, 3701*
Hibiscus denudatus Bentham. Subshrub; rocky, calcareous soils in scrub grassland. *SC 127*
**Malva parviflora* Linnaeus. Spring annual; localized at ranch headquarters. *2384*
Malvastrum bicuspidatum (S. Watson) Rose subsp. *bicuspidatum.* Subshrub; south-facing rocky bluff in scrub grassland near southeast boundary of flora area. *3754*
Malvella leprosa (Ortega) Krapovickas. Perennial; margin of cattle pond near south end of study area. *1956*
Pseudabutilon thurberi (A. Gray) Fryxell [*Abutilon thurberi* A. Gray]. Subshrub; localized in Josephine Canyon at western edge of study area. *2816, 3299, 3932*
Rhynchosida physocalyx (A. Gray) Fryxell. Perennial; level ground in scrub grassland and encinal. *SC 75, SC 1092*
Sida abutilifolia Miller [corrected spelling of *Sida abutifolia* Miller; see Tropicos 2019]. Perennial; rocky slopes and calcareous soils in scrub grassland and encinal. *SC 64, 3705*
Sida glabra Miller. Subshrub; rocky drainages in scrub grassland in upper Fresno Canyon and Grosvenor Hills at south end of study area. New to Arizona and western U.S. (Carnahan 2017). *SC 1070, 1950, 3898*
Sida spinosa Linnaeus. Summer annual; scrub grassland. *SC 174*
Sphaeralcea ambigua A. Gray. Subshrub; a single plant in scrub grassland. *SC 484*
Sphaeralcea emoryi Torrey ex A. Gray. Subshrub; scrub grassland, also introduced in encinal after mine clean-up. *1233, 3487, 3732*
Sphaeralcea hastulata A. Gray. Subshrub; scrub grassland on road to Alto Gulch. *SC 454, 1528*
Sphaeralcea laxa Wooton & Standley. Subshrub; scrub grassland and encinal. *SC 95, 1529, 3510*
Waltheria indica Linnaeus. Perennial; south-facing rocky slope in Grosvenor Hills. *1485*

MARTYNIACEAE
Proboscidea parviflora (Wooton) Wooton & Standley subsp. *parviflora*. Summer annual; scrub grassland and encinal. *SC 198*

MENISPERMACEAE
Cocculus diversifolius de Candolle. Perennial vine; scrub grassland and Bond and Josephine canyons. *SC 475, 3798*

MOLLUGINACEAE
Glinus radiatus (Ruiz & Pavón) Rohrbach. Summer annual, flowering just before monsoon rains; margins of cattle ponds. *SC 27, SC 34, SC 517, SC 1218, 2142, 3238, 3284*
Mollugo verticillata Linnaeus. Summer annual; scrub grassland. *SC 589, 2603, 3492*

MONTIACEAE
Calandrinia ciliata (Ruiz & Pavón) de Candolle. Spring annual, flowers white; scrub grassland. *SC 308, 2325*
Cistanthe monandra (Nuttall) Hershkovitz. Spring annual; sandy soil in scrub grassland. *SC 340, 2907*
Phemeranthus aurantiacus, see *Talinum aurantiacum,* TALINACEAE
Phemeranthus parviflorus (Nuttall) Kiger. Perennial; gravelly slopes in scrub grassland. *SC 168*

MORACEAE

Morus microphylla Buckley. Shrub; north-facing slopes and seasonal drainages in scrub grassland. *SC 393, SC 727, 2022*

NAMACEAE

Nama dichotoma (Ruiz & Pavón) Choisy. Summer annual; steep, north-facing slope in encinal in Alto Gulch. *3533*

Nama hispida A. Gray. Spring annual; level, sandy soil in scrub grassland. *SC 374, 1782*

NYCTAGINACEAE

Allionia incarnata Linnaeus. Perennial; scrub grassland. *SC 51, SC 72, SC 1068, 2349*

Boerhavia coccinea Miller. Perennial; scrub grassland; *SC 145, 2612*

Boerhavia coulteri (Hooker f.) S. Watson. Summer annual; scrub grassland. *1783, 3233*

Boerhavia erecta Linnaeus. Summer annual; scrub grassland. *SC 608, SC 664, SC 680, 3268*

Boerhavia megaptera Standley. Summer annual; two populations on south-facing rocky slopes in south part of study area. *3272, 3883*

Boerhavia wrightii A. Gray. Summer annual; seasonal drainages in scrub grassland. *SC 634, 3914*

Commicarpus scandens (Linnaeus) Standley. Perennial; rocky slopes and beneath shrubs in scrub grassland. *SC 80, 2348*

Mirabilis albida (Walter) Heimerl. Perennial; scrub grassland and encinal. *SC 601*

Mirabilis linearis (Pursh) Heimerl var. *linearis*. Perennial; open, rocky ground in scrub grassland. *SC 476, 1781, 2386*

Mirabilis longiflora Linnaeus. Perennial; shady drainages in scrub grassland and encinal. *SC 88, 1248*

Mirabilis melanotricha (Standley) Spellenberg. Perennial; rocky, seasonal drainages in encinal in Santa Rita foothills. *SC 692, 1246*

OLEACEAE

Fraxinus gooddingii Little. Small tree; rocky drainages in Grosvenor Hills. *SC 315, 1356, 2568*

Fraxinus velutina Torrey. Tree; seasonal drainages in scrub grassland. *SC 335, 1268*

**Olea europaea* Linnaeus. Tree; planted historically and persisting at Salero Camp (ghost town); also a small shrub (sprouting from root?) 8 feet away from original tree. *SC 1141*

ONAGRACEAE

Epilobium canum (Greene) P. H. Raven subsp. *latifolium* (Hooker) P. H. Raven [*Zauschneria latifolia* (Hooker) Greene]. Perennial; rocky seasonal drainages in scrub grassland and encinal. *SC 216, 3479, 3550*

Eremothera chamaenerioides (A. Gray) W. L. Wagner & Hoch [*Oenothera chamaenerioides* A. Gray]. Spring annual; rocky ground and sandy washes in scrub grassland. *SC 291, 3623*

Eulobus californicus Nuttall ex Torrey & A. Gray [*Camissonia californica* (Nuttall ex Torrey & A. Gray) P. H. Raven]. Spring annual; rocky slopes in scrub grassland. *SC 328*

Oenothera caespitosa Nuttall. Perennial; rock outcrops and rock clefts along seasonal drainages. *SC 368, 3685*

Oenothera curtiflora W. L. Wagner & Hoch [*Gaura parviflora* Douglas ex Lehmann]. Spring annual; localized along lower Bond Canyon. *SC 500, 3753*

Oenothera platanorum P. H. Raven & D. R. Parnell. Perennial; seasonal drainages in scrub grassland. *SC 499, 3751*

Oenothera podocarpa (Wooton & Standley) Krakos & W. L. Wagner [*Gaura hexandra* Ortega subsp. *gracilis* (Wooton & Standley) P. H. Raven & D. P. Gregory]. Perennial; encinal in foothills of Santa Rita Mountains. *1223, 1245*

Oenothera primiveris A. Gray. Spring annual; scrub grassland. *SC 330, 3606*

Oenothera rosea L'Héritier ex Aiton. Perennial; seasonal drainage in scrub grassland, with *O. platanorum*. *SC 1181, 3752*

Oenothera suffrutescens (Seringe) W. L. Wagner & Hoch [*Gaura coccinea* Pursh]. Perennial; small population in calcareous soil in scrub grassland. *3734*

OROBANCHACEAE

Brachystigma wrightii (A. Gray) Pennell. Perennial; rocky slopes in scrub grassland and encinal. *SC 169, 1906, 1914*

Castilleja minor (A. Gray) A. Gray var. *minor*. Spring annual; moist soil along seasonal drainage in scrub grassland in lower Bond Canyon. *SC 342, 3748*
Castilleja tenuiflora Bentham. Perennial; rocky slopes in encinal. *SC 9, SC 1192, 1503*
Orobanche cooperi (A. Gray) A. Heller subsp. *cooperi*. Annual; steep, north-facing slope in scrub grassland; presumed host *Artemisia ludoviciana*. *1365*

OXALIDACEAE
Oxalis corniculata Linnaeus. Perennial; rocky ground in scrub grassland. *SC 1178*
Oxalis latifolia Kunth. Perennial; rocky slopes in scrub grassland and encinal. *SC 38, 1998*
Oxalis stricta Linnaeus. Perennial; rocky seasonal drainages in scrub grassland. *SC 444*

PAPAVERACEAE
Argemone pleiacantha Greene subsp. *pleiacantha*. Annual or biennial; road margins and rocky slopes in scrub grassland. *SC 429*
Corydalis aurea Willdenow subsp. *occidentalis* (A. Gray) Ownbey. Spring annual; rocky ground in scrub grassland and encinal. *SC 349, 2913*
Eschscholzia californica Chamisso subsp. *mexicana* (Greene) C. Clark [*E. mexicana* Greene]. Spring annual; scrub grassland. *SC 285, 2906*

PASSIFLORACEAE
Passiflora mexicana Jussieu. Perennial vine; east-facing rock outcrop in scrub grassland in Grosvenor Hills. *1965*

PETIVERIACEAE
Rivina humilis Linnaeus. Perennial; boulder outcrops in scrub grassland. *SC 43, 3881*

PHRYMACEAE
Erythranthe floribunda (Lindley) G. L. Nesom [*Mimulus floribundus* Lindley]. Spring annual; seasonal drainages in scrub grassland. *3650, 3656, 3667*
Erythranthe guttata (de Candolle) G. L. Nesom [*Mimulus guttatus* de Candolle]. Perennial; seasonal drainages in scrub grassland and encinal. *SC 345, SC 1086, 3046*
Erythranthe rubella (A. Gray) N .S. Fraga [*Mimulus rubellus* A. Gray]. Spring annual; sandy soil along drainages in scrub grassland. *SC 354, 3627*

PHYTOLACCACEAE (*Rivina*), see **PETIVERIACEAE**

PLANTAGINACEAE
Maurandella antirrhiniflora (Humboldt & Bonpland ex Willdenow) Rothmaler [*Maurandya antirrhiniflora* Humboldt & Bonpland ex Willdenow]. Perennial vine; shaded rock slopes in scrub grassland and encinal. *SC 488, 2608*
Mecardonia procumbens (Miller) Small. Perennial; rocky drainages and seasonally wet areas in scrub grassland. *SC 99, SC 1063, 2135*
Nuttallanthus texanus (Scheele) D. A. Sutton. Spring annual; rocky slopes and drainages in scrub grassland. *SC 402, 3616*
Penstemon barbatus (Cavanilles) Roth. Perennial; rocky slopes in scrub grassland and encinal. *SC 97, 1257*
Penstemon parryi A. Gray. Perennial; rocky slopes in scrub grassland. *SC 323, SC 1060*
Plantago patagonica Jacquin. Spring annual; scrub grassland. *SC 405, 2321*
Plantago virginica Linnaeus. Spring annual; seasonal drainages in scrub grassland. *SC 463, 3655*
Sairocarpus nuttallianus (Bentham ex A. de Candolle) D. A. Sutton. Spring annual; south-facing, rocky slopes in scrub grassland. *SC 403, 3702*
Schistophragma intermedium (A. Gray) Pennell. Summer annual; rocky slopes and seasonal drainages in scrub grassland. *SC 637*
Stemodia durantifolia (Linnaeus) Swartz. Perennial; rock clefts along seasonal drainages in scrub grassland. *SC 334, 3801*
Veronica anagallis-aquatica Linnaeus. Spring annual; seasonal drainages in scrub grassland. *SC 442, SC 1056*
Veronica peregrina Linnaeus. Spring annual; moist soil at cattle pond margins and seasonal drainages in scrub grassland. *SC 309, 2893*

PLUMBAGINACEAE

Plumbago zeylanica Linnaeus [*P. scandens* Linnaeus]. Perennial; seasonal drainages and rocky slopes in scrub grassland. *SC 25, 3768*

POLEMONIACEAE

Eriastrum diffusum (A. Gray) Mason. Spring annual; sandy soil in scrub grassland. *SC 362, 2319*

Gilia flavocincta A. Nelson subsp. *australis* (A. & V. Grant) Day & V. Grant. Spring annual; scrub grassland. *SC 341, SC 1077, 2309, 2905*

Gilia mexicana A. & V. Grant. Spring annual; scrub grassland. *SC 421, SC 1078, 2308*

Ipomopsis thurberi (A. Gray) V. E. Grant. Perennial; encinal. *SC 239, SC 605*

Leptosiphon chrysanthus J. M. Porter and R. Patterson subsp. *chrysanthus* J. M. Porter and R. Patterson [*L. aureus* subsp. *aureus* (Nuttall) J. M. Porter and L. A. Johnson, *nomen illegitimum. Linanthus aureus* (Nuttall) Greene]. Spring annual; small population in scrub grassland near ranch headquarters. *SC 422*

Linanthus bigelovii (A. Gray) Greene. Spring annual; scrub grassland. *SC 391, SC 1081, 2310, 2912*

Loeselia glandulosa (Cavanilles) G. Don. Perennial; rocky slopes in encinal. *SC 357, 1520, 3489*

Phlox gracilis (Hooker) Greene [*Microsteris gracilis* (Hooker) Greene]. Spring annual; seasonal drainages in scrub grassland. *SC 311, SC 410, 3611*

POLYGALACEAE

Hebecarpa barbeyana (Chodat) J. R. Abbott [*Polygala barbeyana* Chodat]. Perennial; rocky, calcareous soils in scrub grassland. *SC 47, SC 50*

Hebecarpa obscura (Bentham) J. R. Abbott [*Polygala obscura* Bentham]. Perennial; scrub grassland. *1948, 1975*

Monnina wrightii A. Gray. Summer annual; encinal in Viceroy Mine Canyon. *2006*

Polygala alba Nuttall. Perennial; rocky ground in scrub grassland. *SC 486*

Rhinotropis lindheimeri (A. Gray) J. R. Abbott var. *parvifolia* (Wheelock) J. R. Abbott [*Polygala lindheimeri* A. Gray var. *parvifolia* Wheelock]. Perennial; small population in scrub grassland near ranch headquarters. *1510*

POLYGONACEAE

Eriogonum abertianum Torrey. Non-seasonal annual; rocky slopes in scrub grassland and encinal. *SC 79, SC 399*

Eriogonum polycladon Bentham. Summer annual; sandy drainages and roadsides in scrub grassland. *SC 197, 3505*

Eriogonum thurberi Torrey. Spring annual; sandy, gravelly soil in scrub grassland along Bond and Josephine canyons. *3721, 3742*

Eriogonum wrightii Torrey ex Bentham var. *wrightii.* Subshrub; rocky ground in scrub grassland and encinal. *SC 227, 3559*

Persicaria pensylvanica (Linnaeus) M. Gómez [*Polygonum pensylvanicum* Linnaeus]. Summer annual; cattle ponds in scrub grassland. *SC 61, SC 549, 2637*

**Polygonum argyrocoleon* Steudel ex Kunze. Spring annual; moist, disturbed ground in scrub grassland. *SC 1067*

**Polygonum aviculare* Linnaeus. Summer annual; cattle pond margins in scrub grassland. *SC 62*

**Rumex crispus* Linnaeus. Perennial; scrub grassland slope with perennial spring at ranch headquarters. *3770, 3810*

PORTULACACEAE

**Portulaca oleracea* Linnaeus. Summer annual; seasonally wet ground in scrub grassland. *SC 1217*

Portulaca suffrutescens Engelmann. Perennial; rocky ground in scrub grassland. *SC 104*

Portulaca umbraticola Kunth. Summer annual; scrub grassland. *SC 84, 3269*

PRIMULACEAE

Androsace occidentalis Pursh. Spring annual; scrub grassland and encinal. *SC 353, SC 1080, 2314, 3609*

RANUNCULACEAE

Anemone tuberosa Rydberg. Perennial; rocky ground in scrub grassland. *SC 286, 3580, 3610*

Clematis drummondii Torrey & A. Gray. Perennial vine; scrub grassland. *SC 497, SC 512*

Delphinium scaposum Greene. Perennial; rocky slopes and flats in scrub grassland. *SC 423, 2394*

Myosurus cupulatus S. Watson. Spring annual; seasonally wet ground in scrub grassland. *SC 310, 2266*

Myosurus minimus Linnaeus. Spring annual; seasonally wet ground in scrub grassland. *SC 409, 2265*
Thalictrum fendleri Engelmann ex A. Gray. Perennial; rocky slopes in scrub grassland and encinal. *SC 606, 1263*

RHAMNACEAE
Condalia correllii M. C. Johnston. Shrub; rocky scrub grassland. *SC 513, 2635*
Sageretia wrightii S. Watson. Shrub; small population on north-facing slope along Josephine Canyon. *3301*
Sarcomphalus obtusifolius (Hooker ex Torrey & A. Gray) Hauenschild [*Ziziphus obtusifolia* (Hooker ex Torrey & A. Gray) A. Gray]. Shrub; scrub grassland and encinal. *SC 510, 3669*

ROSACEAE
Cercocarpus breviflorus A. Gray [*C. montanus* Rafinesque var. *paucidentatus* (S. Watson) F. L. Martin]. Shrub; encinal in Santa Rita foothills in northeast part of flora area. *1230*
**Pyracantha fortuneana* (Maximowicz) Li. Shrub; historical plantings near ranch headquarters, persisting but probably not reproducing. *SC 436*

RUBIACEAE
Bouvardia ternifolia (Cavanilles) Schlechtendal. Shrub; scrub grassland and encinal. *SC 136, 3802*
Diodia teres Walter. Summer annual; scrub grassland. *SC 671, 1946, 1976*
Galium aparine Linnaeus. Non-seasonal annual; scrub grassland and encinal. *SC 395, SC 1082*
Galium microphyllum A. Gray. Perennial; shaded drainages in scrub grassland and encinal. *SC 1145, 3560*
Galium proliferum A. Gray. Spring annual; seasonal drainages and shaded areas in scrub grassland. SC 339, 2392
Galium wrightii A. Gray. Perennial; scrub grassland and encinal. *SC 548, SC 657, 1262*
Hedyotis vegrandis W. H. Lewis. Summer annual; cattle pond near Fresno Canyon in south part of study area. *2643* (PTBG)
Mitracarpus hirtus (Linnaeus) de Candolle [*M. breviflorus* A. Gray]. Summer annual; scrub grassland and encinal. *SC 158, 3295*
Stenotis greenei (A. Gray) Terrell & H. Robinson [*Hedyotis greenei* A. Gray]. Summer annual; encinal in Viceroy Mine Canyon. *3366*

RUTACEAE
Ptelea trifoliata Linnaeus. Shrub; steep, north-facing slopes in Grosvenor Hills and Fresno Canyon. *1364, 2391, 3680, 3745*

SALICACEAE
Populus fremontii S. Watson subsp. *fremontii.* Tree; seasonal drainages and cattle ponds in scrub grassland. *SC 1042, 3503*
Salix bonplandiana Kunth. Tree; small population in lower Bond Canyon near confluence with Josephine Canyon. *SC 646*
Salix exigua Nuttall. Small tree; seasonal drainages in scrub grassland. *SC 647, 1267*
Salix gooddingii Ball. Tree; natural springs, cattle ponds, and seasonal drainages in scrub grassland and encinal. *SC 361, SC 431, SC 1089*
Salix taxifolia Kunth [*S. exilifolia* Dorn]. Small tree; rocky drainages in scrub grassland. *SC 415, SC 416, 3615*

SANTALACEAE, see **COMANDRACEAE** (*Comandra*) and **VISCACEAE** (*Phoradendron*)

SAPINDACEAE
Dodonaea viscosa (Linnaeus) Jacquin [*D. angustifolia* Linnaeus f.]. Shrub; rocky slopes in scrub grassland. *SC 189, 3548, 3585*
Sapindus saponaria Linnaeus [*S. drummondii* Hooker & Arnott. *S. saponaria* var. *drummondii* (Hooker & Arnott) L. D. Benson]. Shrub or small tree; seasonal drainages in scrub grassland. *SC 514, 3101*

SAXIFRAGACEAE
Heuchera sanguinea Engelmann. Perennial; shaded rock ledges in scrub grassland and encinal. *SC 129, 1379*

SCROPHULARIACEAE

Limosella acaulis Sessé & Mociño. Aquatic spring annual; localized at Cieneguita Spring and in Cieneguita Canyon. *SC 20*

SOLANACEAE

Calibrachoa parviflora (Jussieu) D'Arcy [*Petunia parviflora* Jussieu]. Summer annual; cattle pond margins in scrub grassland. *SC 419, 2143*

Chamaesaracha coronopus (Dunal) A. Gray. Perennial; calcareous soils in scrub grassland. *SC 5, SC 67, 3723*

Datura quercifolia Kunth. Summer annual; seasonal drainages, cattle pond margins, and rocky hillsides in scrub grassland and encinal. *SC 670, 2671*

Datura wrightii Regel. Perennial; scrub grassland and encinal. *SC 438, 2120*

Lycium andersonii A. Gray. Shrub; scrub grassland. *3762*

Lycium berlandieri Dunal. Shrub; scrub grassland and encinal. *SC 551, 3579*

Lycium exsertum A. Gray. Shrub; rocky slopes in scrub grassland. *SC 264, SC 957*

Nicotiana obtusifolia Mertens & Galeotti. Perennial; scrub grassland and encinal. *SC 356, 2977, 3746*

Physalis acutifolia (Miers) Sandwith. Summer annual; one population at Tejano Spring. *SC 111*

Physalis hederifolia A. Gray. Perennial; scrub grassland. *1238, 3217*

Physalis pubescens Linnaeus. Summer annual; scrub grassland. *SC 115, SC 616*

Physalis solanacea (Schlechtendal) Axelius [*Margaranthus solanaceus* Schlechtendal]. Summer annual; scrub grassland and encinal. *2009, 3497*

Solanum adscendens Sendtner. Summer annual; scrub grassland and encinal. *1962, 2567*

Solanum elaeagnifolium Cavanilles. Perennial; scrub grassland, especially disturbed ground. *SC 54, 2134, 3814*

Solanum houstonii Martyn [*S. tridynamum* Dunal]. Shrub; south-facing rocky slope in scrub grassland in Grosvenor Hills. New for United States. *3899*

Solanum lumholtzianum Bartlett. Summer annual; scrub grassland. *SC 161, SC 698*

Solanum nigrescens M. Martens & Galeotti [*S. douglasii* Dunal]. Perennial; scrub grassland and encinal. *SC 892, SC 1040, 1224, 1228, 3484*

TALINACEAE

Talinum aurantiacum Engelmann [*Phemeranthus aurantiacus* (Engelmann) Kiger. See Price & Ferguson 2012]. Perennial; rocky slopes in scrub grassland and encinal. *SC 40, 1987, 2549*

Talinum paniculatum (Jacquin) Gaertner. Perennial; rocky slopes in scrub grassland and encinal. *SC 87*

TAMARICACEAE

**Tamarix chinensis* Loureiro. Small tree; drainages in scrub grassland and encinal. *1232, 1784, 3799*

URTICACEAE

Parietaria pensylvanica Muhlenberg ex Willdenow. Spring annual; shaded locations in scrub grassland and encinal. *SC 294, SC 306, SC 1083*

VERBENACEAE

Aloysia wrightii (A. Gray ex Torrey) A. Heller. Shrub; rocky slopes and calcareous soils in scrub grassland and encinal. *SC 185, 3474*

Bouchea prismatica (Linnaeus) Kuntze. Summer annual; seasonal drainages in scrub grassland. *SC 98*

Glandularia gooddingii (Briquet) Solbrig. Perennial; small population on west side of Grosvenor Hills. *3744*

Glandularia latilobata (L. M. Perry) G. L. Nesom [*G. bipinnatifida* (Nuttall) Nuttall var. *latilobata* (L. M. Perry) B. L. Turner]. Perennial; rocky ground in scrub grassland and encinal. *SC 585, SC 1098, SC 1142, 3691*

Phyla nodiflora (Linnaeus) Greene. Perennial; ranch headquarters and cattle pond margin in scrub grassland. *SC 33, SC 1210, 1955*

Verbena bracteata Lagasca & Rodríguez. Spring or summer annual; margins of cattle ponds in scrub grassland. *SC 26*

Verbena gracilis Desfontaines. Perennial; scrub grassland and encinal. *SC 599, 2602*

Verbena xylopoda (L. M. Perry) G. L. Nesom [*V. neomexicana* Small var. *xylopoda* L. M. Perry]. Perennial; rocky slopes in scrub grassland and encinal. *SC 55, SC 1175, 1264, 1990*

VIBURNACEAE

Sambucus cerulea Rafinesque [*S. nigra* Linnaeus subsp. *cerulea* (Rafinesque) Bolli]. Shrub; upper Fresno Canyon below dirt-dammed cattle pond. *SC 1073*

VIOLACEAE

Hybanthus verticillatus (Ortega) Baillon. Rhizomatous perennial; calcareous soils in scrub grassland. *SC 6, 2324*

VISCACEAE

Phoradendron californicum Nuttall. Perennial; parasitic on *Prosopis velutina* and *Condalia correllii* in scrub grassland. *SC 955, SC 1171*

Phoradendron capitellatum Torrey ex Trelease. Perennial; parasitic on *Juniperus arizonicus* in scrub grassland and encinal. *SC 554, 3263*

Phoradendron leucarpum (Rafinesque) Reveal & M. C. Johnston [*P. leucarpum* subsp. *macrophyllum* (Engelmann) J. R. Abbott & R. L. Thompson. *P. leucarpum* subsp. *tomentosum* (de Candolle) J. R. Abbott & R. L. Thompson. *P. serotinum* (Rafinesque) M. C. Johnston subsp. *macrophyllum* (Engelmann) Kuijt. *P. serotinum* subsp. *tomentosum* (de Candolle) Kuijt]. Perennial; parasitic on *Celtis reticulata, Fraxinus velutina,* and *Quercus* in scrub grassland and encinal. *SC 333, 2087, 3741*

VITACEAE

Cissus trifoliata (Linnaeus) Linnaeus. Perennial vine; drainage below cattle pond in scrub grassland, also ranch headquarters. *SC 1211, 3891*

Vitis arizonica Engelmann. Perennial vine; seasonal drainages and north-facing slopes in scrub grassland and encinal. *SC 474*

ZYGOPHYLLACEAE

Kallstroemia californica (S. Watson) Vail. Summer annual; scrub grassland in Ash Canyon and Cieneguita Canyon. *3471*

Kallstroemia grandiflora Torrey ex A. Gray. Summer annual; scrub grassland and encinal. *SC 73, 2610, 2646*

Kallstroemia parviflora J. B. S. Norton. Summer annual; rocky slopes in scrub grassland. *2645*

#*Larrea tridentata* (Candolle) Coville. Shrub; small population on west-facing slope in scrub grassland, likely introduced with driveway gravels; not native to study area. *SC 336*

**Tribulus terrestris* Linnaeus. Summer annual; road margins in scrub grassland. *1907*

MONOCOTS

AMARYLLIDACEAE

Allium rhizomatum Wooton & Standley. Perennial; north-facing slopes and seasonal drainages in scrub grassland and encinal. *SC 131, SC 569*

Habranthus longifolius (Hemsley) Flagg, G. Lomax Smith & Meerow [*Zephyranthes longifolia* Hemsley; see Flagg et al. 2010]. Perennial; level, rocky scrub grassland on west side of Grosvenor Hills. *2634* (SEINet)

Nothoscordum bivalve (Linnaeus) Britton. Perennial; seasonal drainages and swales in scrub grassland and encinal. *SC 386, 3511*

ARACEAE

Lemna aequinoctialis Welwitsch. Aquatic summer annual; cattle ponds and seasonal drainages in scrub grassland and encinal. *1488, 2129*

Lemna gibba Linnaeus. Aquatic summer annual; cattle ponds and seasonal drainages in scrub grassland and encinal. *SC 1139, SC 1219, 2760*

ASPARAGACEAE

Agave palmeri Engelmann. Perennial; scrub grassland and encinal. *SC 537*

Agave schottii Engelmann var. *schottii.* Perennial; rocky ground in scrub grassland and encinal. *SC 489*

Dasylirion wheeleri S. Watson. Shrub; rocky slopes in scrub grassland and encinal. *SC 511*

Dipterostemon capitatus (Bentham) Rydberg subsp. *pauciflorus* (Torrey) R. E. Preston [*Dichelostemma capitatum* (Bentham) Alphonso Wood subsp. *pauciflorum* (Torrey) Keator; see Preston 2017]. Perennial; scrub grassland. *SC 324, 2301*

Echeandia flavescens (Schultes & Schultes f.) Cruden. Perennial; seasonally moist ground in scrub grassland and encinal. *SC 69, SC 613*

Milla biflora Cavanilles. Perennial; rocky ground in scrub grassland and encinal. *SC 119, 1893, 3262*
Nolina microcarpa S. Watson. Shrub; scrub grassland and encinal. *SC 493*
Yucca baccata Torrey var. *brevifolia* L. D. Benson & R. A. Darrow. Shrub; rocky, gravelly soil in scrub grassland and encinal. *SC 451*
Yucca elata (Engelmann) Engelmann. Shrub; scrub grassland. *SC 1102*
Yucca cf. *schottii* [*Y. schottii* Engelmann, *nomen illegitimum. Y.* x *schottii* (Engelmann) pro. sp. Lenz & Hanson. Appears as *Y. madrensis* Gentry in many references (e.g., Allred & Ivey 2012). Nomenclature of this yucca is unresolved; see Lenz & Hanson 2000, 2001; Hess & Robbins 2002]. Shrub; rocky ground in scrub grassland and encinal. *SC 534*

COMMELINACEAE
Commelina dianthifolia Delile. Perennial; shaded slopes and seasonal drainages in encinal. *SC 134, SC 575*
Commelina erecta Linnaeus. Perennial; rocky slopes and seasonal drainages in scrub grassland. *SC 105, 3219*
Tradescantia pinetorum Greene. Perennial; canyon bottoms in encinal. *1249*

CYPERACEAE
Bulbostylis capillaris (Linnaeus) Kunth ex C. B. Clarke. Summer annual; rocky slopes in encinal. *1479, 1516*
Carex leucodonta Holm. Perennial; encinal in Viceroy Mine Canyon. *1254*
Cyperus amabilis Vahl. Summer annual; rocky drainage in scrub grassland. *3482*
Cyperus dentoniae G. Tucker. Perennial; south-facing rocky slope in scrub grassland. *1995, 3912; Licher 5733* (ASC)
Cyperus dipsaceus Liebmann. Perennial; scrub grassland and encinal. *SC 653, 1974*
Cyperus esculentus Linnaeus. Perennial; wet ground and seasonal drainages in scrub grassland. *SC 574, SC 628, 1532, 1961, 3280; Licher 5737* (ASC)
Cyperus fendlerianus Boeckeler. Perennial; encinal. *1250*
Cyperus flavicomus Michaux. Summer annual; cattle ponds and seasonal drainages in scrub grassland. *SC 172, 1491, 1979, 2691, 3390, 3938; Licher 5735* (ASC)
Cyperus hermaphroditus (Jacquin) Standley. Perennial; rocky slopes and canyons in scrub grassland and encinal. *1255, 1354, 1984*
Cyperus mutisii (Kunth) Grisebach. Perennial; encinal in Viceroy Mine Canyon in Santa Rita foothills. *1518*
Cyperus niger Ruiz & Pavón. Perennial; springs and seeps in scrub grassland. *SC 627, 1973, 3226*
Cyperus pallidicolor (Kükenthal) G. Tucker. Perennial; shaded slopes and drainages in scrub grassland and encinal. *SC 570, SC 683, 1989*
Cyperus sphaerolepis Boeckeler. Perennial; rocky slopes in scrub grassland and encinal. *1896, 2609*
Cyperus squarrosus Linnaeus. Summer annual; seasonally wet soil and bedrock in scrub grassland and encinal. *SC 695, 1383, 1894; Licher 5736* (ASC)
Cyperus subsquarrosus (Muhlenberg) Bauters [*Lipocarpha micrantha* (Vahl) G. C. Tucker]. Summer annual; moist, sandy soil in seasonal drainages in scrub grassland and encinal. *3367, 3512, 3574*
Eleocharis montevidensis Kunth. Perennial; cattle ponds and seasonal drainages in scrub grassland. *SC 394, SC 1140, 1237, 2383*
Eleocharis palustris (Linnaeus) Roemer & Schultes. Perennial; cattle ponds and seasonal drainages in scrub grassland. *SC 580, SC 1190, 2639*
Fimbristylis annua (Allioni) Roemer & Schultes. Summer annual; seasonal drainages in scrub grassland and encinal. *SC 592, SC 881, 2699, 3935; Licher 5738* (ASC)
Fuirena simplex Vahl var. *aristulata* (Torrey) Kral. Summer annual; Tejano Spring in Grosvenor Hills. *SC 879, 3225*; *Licher 5731* (ASC; det. as var. *simplex*)

JUNCACEAE
Juncus bufonius Linnaeus. Spring annual; seasonal drainages in scrub grassland and encinal. *SC 11, SC 19, SC 1182, 3794*
Juncus interior Wiegand. Perennial; seasonal drainages in scrub grassland and encinal. *SC 505, SC 1196*
Juncus marginatus Rostkovius. Perennial; seasonal drainage in lower Bond Canyon. *3817*
Juncus mexicanus Willdenow ex Schultes & Schultes f. Perennial; one population at Tejano Spring. *1921*
Juncus torreyi Coville. Perennial; seasonal drainage in scrub grassland. *SC 504, 3816*

LILIACEAE

Calochortus ambiguus (M. E. Jones) Ownbey. Perennial; north-facing slopes in scrub grassland and encinal. *SC 466*
Calochortus kennedyi Porter. Perennial; scrub grassland. Flowers yellow, occasionally orange. *SC 441, 2306*

NAJADACEAE
Najas guadalupensis (Sprengel) Magnus. Aquatic summer annual; cattle ponds and seasonal drainages in scrub grassland. *1384, 2693, 3572*

POACEAE
**Alopecurus carolinianus* Walter. Spring–summer annual; cattle pond in encinal on north side of Grosvenor Hills. *SC 430*
Aristida adscensionis Linnaeus. Summer or non-seasonal annual; scrub grassland and encinal. *SC 194, 2688*
Aristida purpurea Nuttall var. *nealleyi* (Vasey) Allred. Perennial; rocky ground in scrub grassland. *SC 23*
#*Aristida purpurea* var. *purpurea*. Perennial; introduced (seeded) in encinal near Alto Gulch during mine clean-up; probably not native to study area. *3921*
Aristida schiedeana Trinius & Ruprecht var. *orcuttiana* (Vasey) Allred & Valdés-Reyna. Perennial; encinal. *SC 241, 1252, 1505*
Aristida ternipes Cavanilles var. *gentilis* (Henrard) Allred. Perennial; rocky ground in scrub grassland and encinal. *SC 610, 2683*
Aristida ternipes var. *ternipes*. Perennial; scrub grassland and encinal. *SC 590, 2680*
**Avena fatua* Linnaeus. Spring annual; scrub grassland and at Tejano Spring. *SC 1179, 3694*
Bothriochloa barbinodis (Lagasca) Herter. Perennial; scrub grassland and encinal. *SC 193, 3372*
**Bothriochloa ischaemum* (Linnaeus) Keng. Perennial; scrub grassland and encinal. *1481, 1909*
Bouteloua aristidoides (Kunth) Grisebach. Summer annual; scrub grassland. *SC 622, 2685*
Bouteloua barbata Lagasca var. *barbata*. Summer annual; open, gravelly soil in scrub grassland. *3271*
Bouteloua barbata var. *rothrockii* (Vasey) Gould. Perennial; scrub grassland. *SC 85, SC 611*
Bouteloua chondrosioides (Kunth) Bentham ex S. Watson. Perennial; rocky scrub grassland and encinal. *SC 200, 3224, 3266*
Bouteloua curtipendula (Michaux) Torrey. Perennial; scrub grassland and encinal. *SC 201, 2681*
Bouteloua eludens Griffiths. Perennial; rocky and calcareous soils in scrub grassland. *SC 640, 1370, 1899*
Bouteloua eriopoda (Torrey) Torrey. Perennial; calcareous soils in scrub grassland. *SC 641, 3373*
Bouteloua gracilis (Kunth) Lagasca ex Griffiths. Perennial; level ground in scrub grassland. *SC 623*
Bouteloua hirsuta Lagasca. Perennial; scrub grassland and encinal. *SC 159, 3236*
Bouteloua radicosa (Fournier) Griffiths. Perennial; rocky slopes and drainages in scrub grassland and encinal. *SC 205, SC 573*
Bouteloua repens (Kunth) Scribner & Merrill. Perennial; scrub grassland and encinal. *SC 226, 2682*
**Bromus catharticus* Vahl var. *catharticus*. Spring annual; scrub grassland at ranch headquarters and lower Bond Canyon. *SC 425, 3766*
Bromus frondosus (Shear) Wooton & Standley. Perennial; shady canyons in encinal. *SC 687, 2008*
**Bromus rubens* Linnaeus. Spring annual; rocky slopes and drainages in scrub grassland and encinal. *SC 247*
**Cenchrus ciliaris* Linnaeus [*Pennisetum ciliare* (Linnaeus) Link]. Perennial; several disparate populations in scrub grassland. *SC 246*
**Cenchrus setaceus* (Forsskål) Morrone [*Pennisetum setaceum* (Forsskål) Chiovenda]. Perennial; rocky, disturbed ground in scrub grassland. *SC 22*
Cenchrus spinifex Cavanilles. Summer annual; disturbed areas in scrub grassland. *SC 144, 3036*
**Chloris virgata* Swartz. Summer annual; seasonal drainages in scrub grassland and encinal. *SC 139, 2675, 3265*
Cottea pappophoroides Kunth. Perennial; seasonally wet ground in scrub grassland. *SC 228, 2000*
**Cynodon dactylon* (Linnaeus) Persoon. Perennial; seasonal drainages and roadsides in scrub grassland and encinal. *SC 388, SC 1054*
**Dactyloctenium aegyptium* (Linnaeus) Willdenow. Summer annual or perhaps perennial; gravel roads and driveways in scrub grassland. *1324*
Dasyochloa pulchella (Kunth) Willdenow ex Rydberg [*Munroa pulchella* (Kunth) L. D. Amarilla]. Perennial; calcareous soils in scrub grassland. *SC 464, 2696*
Digitaria californica (Bentham) Henrard. Perennial; level ground in scrub grassland. *SC 90, SC 663, 2606, 2673*
Digitaria insularis (Linnaeus) Fedde. Perennial; rock outcrops and along drainages in scrub grassland. *SC 124, SC 639, 3546, 3575*

Digitaria pubiflora (Vasey) J. Wipff. Perennial; rocky slopes in scrub grassland and encinal. *1234, 1477, 1913, 3731*

**Digitaria sanguinalis* (Linnaeus) Scopoli. Summer annual; seasonally wet areas in scrub grassland and encinal. *SC 883, 1226, 2641*

Dinebra panicea (Retzius) P. M. Peterson & N. Snow [*Leptochloa panicea* (Retzius) Ohwi]. Summer annual; scrub grassland. *SC 128, SC 249, 3264*

Dinebra viscida (Scribner) P. M. Peterson & N. Snow [*Leptochloa viscida* (Scribner) Beal]. Summer annual; drainage in scrub grassland near Coal Mine Canyon. *3276*

Diplachne fusca (Linnaeus) P. Beauvois ex Roemer & Schultes subsp. *fascicularis* (Lamarck) P. M. Peterson & N. Snow [*Leptochloa fusca* (Linnaeus) Kunth subsp. *fascicularis* (Lamarck) P. M. Peterson & N. Snow]. Summer annual; cattle ponds and seasonally wet areas in scrub grassland. *SC 582, 1964, 2131, 3277*

Disakisperma dubium (Kunth) P. M. Peterson & N. Snow [*Leptochloa dubia* (Kunth) Nees]. Perennial; scrub grassland and encinal. *SC 600, 2674*

**Echinochloa colona* (Linnaeus) Link. Summer annual; cattle ponds and disturbed areas in scrub grassland. *SC 1207*

**Echinochloa crus-galli* (Linnaeus) P. Beauvois. Summer annual; cattle ponds and seasonally wet ground in scrub grassland. *SC 584, SC 614, 2640, 2692*

Elionurus barbiculmis Hackel. Perennial; rocky slopes in encinal. *SC 135, 1912*

Elymus elymoides (Rafinesque) Swezey. Perennial; scrub grassland and encinal. *SC 18, SC 1085, 3058*

Enneapogon desvauxii P. Beauvois. Perennial; rocky and calcareous soils in scrub grassland. *SC 223*

**Eragrostis barrelieri* Daveau. Summer annual; gravels roads in scrub grassland. *1533, 3527, 3555*

**Eragrostis cilianensis* (Allioni) Vignolo ex Janchen. Summer annual; roadsides and seasonal drainages in scrub grassland. *SC 626, 2020*

**Eragrostis curvula* (Schrader) Nees. Perennial; scrub grassland and encinal. *SC 462*

**Eragrostis echinochloidea* Stapf. Perennial; adventive along roadsides and sandy drainages in scrub grassland. *SC 187, 2001*

Eragrostis intermedia A. S. Hitchcock. Perennial; rocky seasonal drainages in scrub grassland and encinal. *SC 190, 3278*

**Eragrostis lehmanniana* Nees. Perennial; disturbed and level ground in scrub grassland and encinal. *SC 426, SC 650, SC 651, 2677*

Eragrostis pectinacea (Michaux) Nees. Summer annual; scrub grassland and encinal. *SC 191, SC 649, 2062, 2678*

**Eragrostis superba* Peyritsch. Perennial; road margins in scrub grassland. *SC 83, 2138*

Eriochloa acuminata (J. Presl) Kunth. Summer annual; rocky seasonal drainages in scrub grassland and encinal. *SC 120, SC 173*

Eriochloa aristata Vasey. Summer annual; one population on north-facing slope in encinal in Grosvenor Hills. *1372*

Festuca octoflora Walter [*Vulpia octoflora* (Walter) Rydberg]. Spring annual; rocky slopes and drainages in scrub grassland. *SC 370, SC 1191*

**Hackelochloa granularis* (Linnaeus) Kuntze. Summer annual; open, rocky ground in scrub grassland. *SC 177, 1940, 1977*

Heteropogon contortus (Linnaeus) P. Beauvois ex Roemer & Schultes. Perennial; rocky slopes in scrub grassland. *SC 123, 3517*

Heteropogon melanocarpus (Elliott) Bentham. Summer annual; rocky ground in scrub grassland. *SC 148, 2697, 3281*

Hilaria belangeri (Steudel) Nash. Perennial; rocky soil in scrub grassland. *SC 327, 3234*

Hilaria mutica (Buckley) Bentham. Perennial; scrub grassland. *SC 39, 3285*

Hopia obtusa (Kunth) Zuloaga & Morrone [*Panicum obtusum* Kunth]. Perennial; seasonally wet soil, ditches, and swales in scrub grassland and encinal. *SC 92, 3239*

**Hordeum murinum* Linnaeus. Summer annual; scrub grassland in Grosvenor Hills. *SC 359*

**Hordeum vulgare* Linnaeus. Summer annual; disturbed roadbed in encinal. *SC 882*

Koeleria pyramidata (Lamarck) P. Beauvois var. *pyramidata.* Perennial; shady canyons and slopes in encinal. *SC 660, 1253*

Leptochloa crinita (Lagasca) P. M. Peterson & N. Snow [*Trichloris crinita* (Lagasca) Parodi]. Perennial; scrub grassland along lower Bond Canyon. *SC 229*

**Melinis repens* (Willdenow) Zizka subsp. *repens.* Perennial; rocky ground, especially south-facing rocky slopes. *SC 149*

Microchloa kunthii Desvaux. Perennial; gravel-filled depressions in granite in scrub grassland and encinal. *SC 609, SC 645*

Muhlenbergia alopecuroides (Grisebach) P. M. Peterson & Columbus [*Lycurus setosus* (Nuttall) C. Reeder]. Perennial; rocky slopes in scrub grassland and encinal. *SC 153, 2679*

Muhlenbergia arizonica Scribner. Perennial; thin soil over bedrock in scrub grassland and encinal. *SC 162, 3270*

Muhlenbergia dumosa Scribner ex Vasey. Perennial; steep, bouldery slopes and cliffs in scrub grassland and encinal. *SC 250, SC 271, SC 396, SC 1100, 3059*

Muhlenbergia emersleyi Vasey. Perennial; rocky slopes in scrub grassland and encinal. *SC 206, 1985, 2815, 3371*

Muhlenbergia fragilis Swallen. Summer annual; scrub grassland. *SC 196*

Muhlenbergia longiligula A. S. Hitchcock. Perennial; sandy drainages in scrub grassland and on north-facing slopes in encinal. *SC 300, 1526, 1527, 2015, 2140, 2141, 3498, 3499, 3500*

Muhlenbergia microsperma (de Candolle) Trinius. Non-seasonal annual; rocky drainages in scrub grassland and encinal. *SC 929, SC 961, SC 1061*

Muhlenbergia minutissima (Steudel) Swallen. Summer annual; scrub grassland. *1362*

Muhlenbergia palmeri Vasey [*M. dubioides* C. O. Goodding]. Perennial; one population in shallow, sandy wash near south end of study area. *3573, 3939*

Muhlenbergia pauciflora Buckley. Perennial; north-facing base of cliff in Grosvenor Hills. *SC 298*

Muhlenbergia porteri Scribner. Perennial; shade of shrubs in scrub grassland and encinal. *SC 59, 1980*

Muhlenbergia repens (J. Presl) A. S. Hitchcock. Perennial; perennial springs and seasonally wet areas in scrub grassland. *1999, 3563, 3809*

Muhlenbergia rigens (Bentham) A. S. Hitchcock. Perennial; springs and drainages in scrub grassland and encinal. *SC 724, 3475, 3508*

Muhlenbergia rigida (Kunth) Trinius. Perennial; scrub grassland and encinal. *SC 299, SC 721, 3494*

Muhlenbergia sinuosa Swallen. Summer annual; seasonally wet areas, scrub grassland and encinal. *SC 210*

Muhlenbergia tenuifolia (Kunth) Trinius. Perennial; rock clefts on slopes and along drainages in encinal. *SC 638, 1521*

Muhlenbergia texana Buckley. Summer annual; rocky drainages in scrub grassland and encinal. *SC 723, 3368*

Muhlenbergia uniseta (Lagasca) Columbus [*Aegopogon tenellus* (de Candolle) Trinius]. Summer annual; north-facing base of cliff in encinal in Grosvenor Hills. *SC 661*

**Panicum antidotale* Retzius. Perennial; margin of large cattle pond in scrub grassland. *SC 477*

**Panicum coloratum* Linnaeus. Perennial; disturbed ground and seasonal drainages in scrub grassland. *SC 76, SC 1200, 1530*

Panicum hallii Vasey. Perennial; calcareous soils in scrub grassland. *3003*

Panicum hirticaule J. Presl. Summer annual; scrub grassland. *SC 572, SC 729, 2700*

Pappophorum vaginatum Buckley. Perennial; sandy, gravelly soil in scrub grassland. *SC 225, 3518, 3526*

Paspalum distichum Linnaeus. Perennial; cattle ponds and semi-permanent streams. *SC 140, 1997, 2130, 2694, 3146*

**Phalaris minor* Retzius. Spring annual; cattle ponds in scrub grassland. *SC 10, SC 1090; Harlan AH-03-25*

Piptochaetium fimbriatum (Kunth) A. S. Hitchcock. Perennial; slopes and canyons in scrub grassland and encinal. *SC 252, 1366, 1992*

Piptochaetium pringlei (Beal) Parodi. Perennial; encinal in Viceroy Mine Canyon. *SC 693*

**Poa annua* Linnaeus. Non-seasonal annual; disturbed, wet ground in scrub grassland. *SC 408, SC 1059*

Poa bigelovii Vasey & Scribner. Spring annual; scrub grassland and encinal. *SC 377, SC 1055, 2351, 3626*

Poa fendleriana (Steudel) Vasey. Perennial; north-facing slopes in encinal. *SC 446, 3730*

**Polypogon monspeliensis* (Linnaeus) Desfontaines. Spring annual; seasonal drainages and cattle pond margins in scrub grassland. *SC 381, SC 1167*

**Polypogon viridis* (Gouan) Breistroffer. Perennial; cattle troughs at Tejano Spring. *SC 1203*

**Schismus barbatus* (Linnaeus) Thellung. Spring annual; disturbed ground in scrub grassland. *2943, 3614*

Schizachyrium cirratum (Hackel) Wooton & Standley. Perennial; rocky areas in scrub grassland. *SC 675*

Schizachyrium sanguineum (Retzius) Alston [*S. sanguineum* var. *hirtiflorum* (Nees) S. L. Hatch]. Perennial; slopes in encinal. *SC 152, 2007, 3483*

Setaria grisebachii Fournier. Summer annual; scrub grassland and encinal. *SC 154, 1361, 1373*

Setaria macrostachya Kunth. Perennial; rocky drainages in scrub grassland. *SC 186, 1229, 1235, 2676*

**Setaria viridis* (Linnaeus) P. Beauvois. Summer annual; disturbed areas in scrub grassland. *2601*

**Sorghum bicolor* (Linnaeus) Moench. Summer annual; roadsides and disturbed ground in scrub grassland. *2149*

**Sorghum halepense* (Linnaeus) Persoon. Perennial; seasonal drainages in scrub grassland. *SC 141, SC 648*

Sphenopholis obtusata (Michaux) Scribner. Summer annual; springs and seasonal drainages in scrub grassland and encinal. *SC 487, SC 1199, 3795*
Sporobolus cryptandrus (Torrey) A. Gray. Perennial; road margins and level scrub grassland. *SC 621, 3231, 3267*
Sporobolus wrightii Munro ex Scribner. Perennial; scrub grassland and encinal. *SC 581, 2024*
Trachypogon spicatus (Linnaeus) Kuntze [*T. secundus* (J. Presl) Scribner]. Perennial; rocky slopes in scrub grassland and encinal. *SC 165, 1915, 1943*
Tridens muticus (Torrey) Nash. Perennial; calcareous soils in scrub grassland. *SC 81*
Urochloa arizonica (Scribner & Merrill) O. Morrone & F. Zuloaga. Summer annual; scrub grassland. *SC 63, 3255*
Zuloagaea bulbosa (Kunth) Bess [*Panicum bulbosum* Kunth]. Perennial; encinal and seasonal drainages in scrub grassland and encinal. *SC 654, 1374*

PONTEDERIACEAE
Heteranthera limosa (Swartz) Willdenow. Aquatic annual; cattle ponds and seasonal drainages in Grosvenor Hills. *SC 170, 1492, 3394*

POTAMOGETONACEAE
Potamogeton pusillus Linnaeus. Aquatic annual; cattle trough at Tejano Spring. *1480*

TYPHACEAE
Typha domingensis Persoon. Perennial; seasonal drainages in scrub grassland. *SC 521*

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ABRIDGED SALERO RANCH IMAGE GALLERY

This abridged gallery of 320 images is organized by major groups (Pteridophytes, Gymnosperms, Magnoliids, Eudicots, Monocots) and then alphabetically by family, genus, and species. A more extensive gallery of 840 images can be accessed at https://canotia.org/volumes/vol16/SaleroRanchGallery.pdf.

Figure 16. Seasonal drainage and scrub grassland with giant sacaton (*Sporobolus wrightii*), velvet ash (*Fraxinus velutina*), and Fremont cottonwood (*Populus fremontii*) near north end of Grosvenor Hills, December 2016.

All photographs by Susan D. Carnahan.

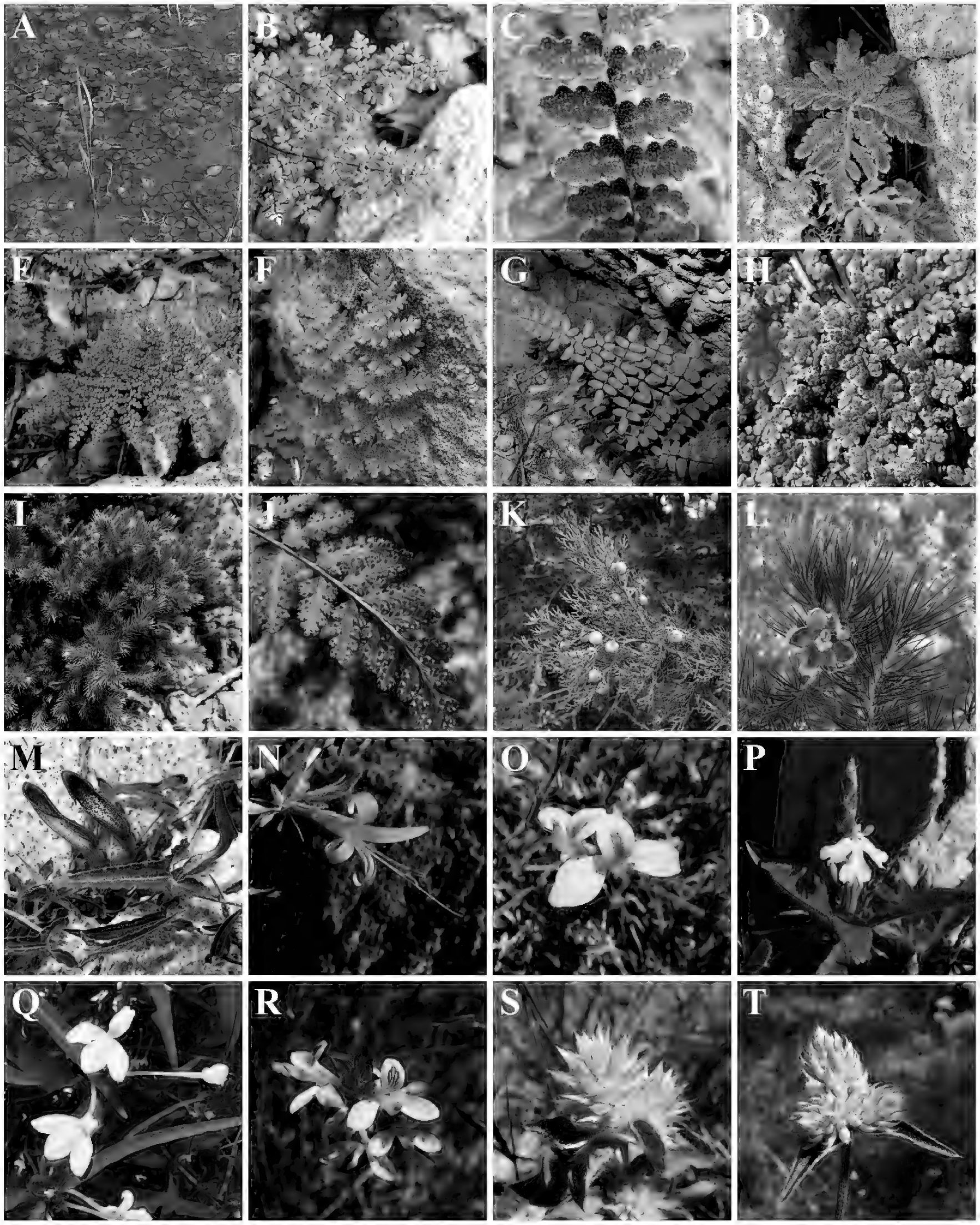

Figure 17. **PTERIDOPHYTES**. **Marsileaceae**: (A) *Marsilea mollis*. **Pteridaceae**: (B) *Argyrochosma incana*; (C) *Astrolepis windhamii*; (D) *Bommeria hispida*; (E) *Myriopteris fendleri*; (F) *Notholaena grayi*; (G) *Pellaea truncata*. **Salviniaceae**: (H) *Azolla filiculoides*. **Selaginellaceae**: (I) *Selaginella rupincola*. **Woodsiaceae**: (J) *Woodsia cochisensis*. **GYMNOSPERMS**. **Cupressaceae**: (K) *Juniperus deppeana*. **Pinaceae**: (L) *Pinus discolor*. **MAGNOLIIDS**. **Aristolochiaceae**: (M) *Aristolochia watsonii*. **EUDICOTS**. **Acanthaceae**: (N) *Anisacanthus thurberi*; (O) *Carlowrightia arizonica*; (P) *Elytraria imbricata*; (Q) *Justicia longii*; (R) *Tetramerium nervosum*. **Amaranthaceae**: (S) *Gomphrena nitida*; (T) *Gomphrena sonorae*.

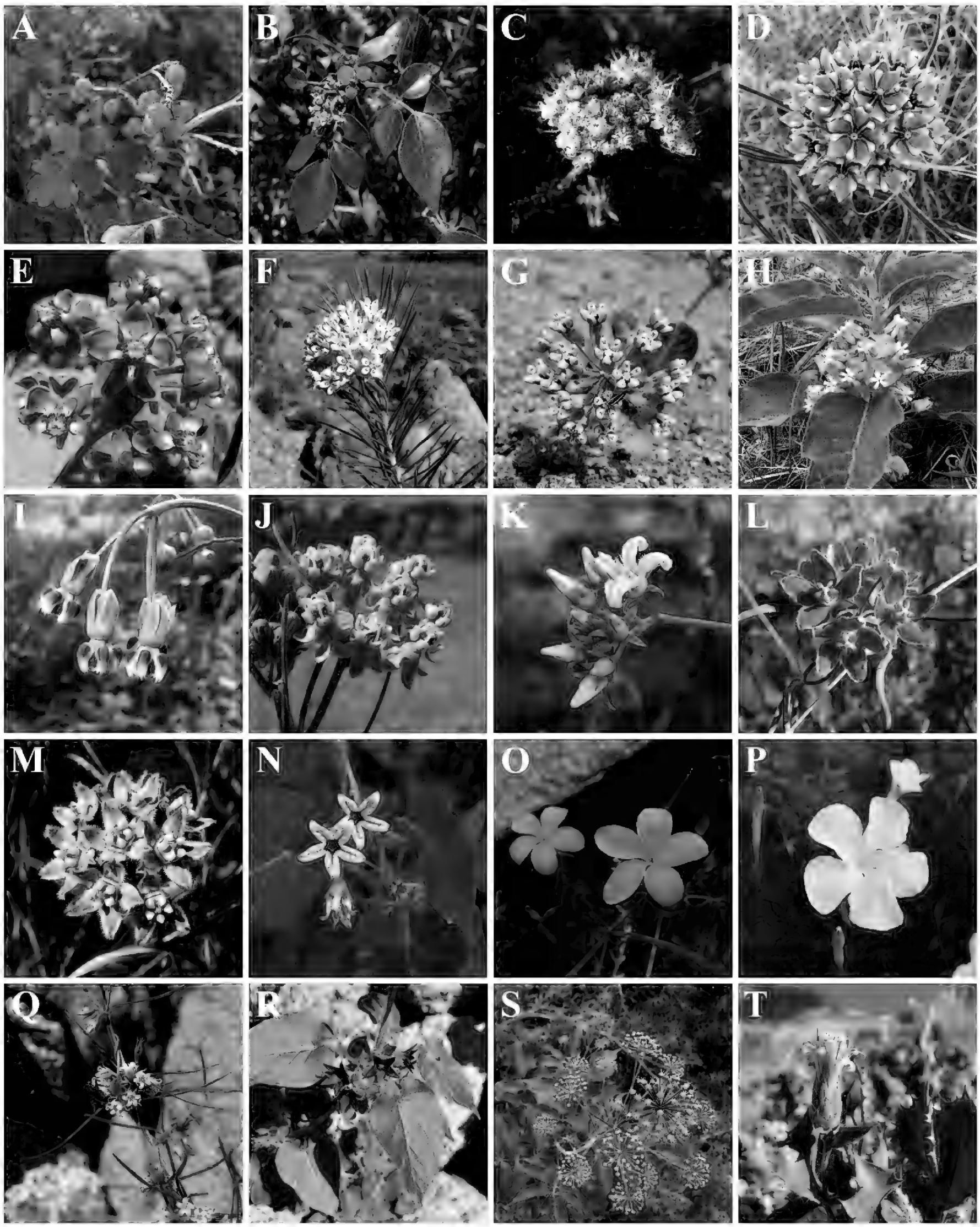

Figure 18. **EUDICOTS** cont. **Anacardiaceae**: (A) *Rhus aromatica* var. *trilobata*; (B) *Rhus virens* var. *choriophylla*. **Apiaceae**: (C) *Lomatium nevadense* var. *parishii*. **Apocynaceae**: (D) *Asclepias asperula*; (E) *Asclepias elata*; (F) *Asclepias linaria*; (G) *Asclepias nummularia*; (H) *Asclepias nyctaginifolia*; (I) *Asclepias quinquedentata*; (J) *Asclepias subverticillata*; (K) *Cynanchum ligulatum*; (L) *Funastrum crispum*; (M) *Funastrum heterophyllum*; (N) *Gonolobus arizonicus*; (O) *Haplophyton cimicidum*; (P) *Mandevilla brachysiphon*; (Q) *Metastelma mexicanum*; (R) *Polystemma* sp. **Araliaceae**: (S) *Aralia humilis*. **Asteraceae**: (T) *Acourtia nana*.

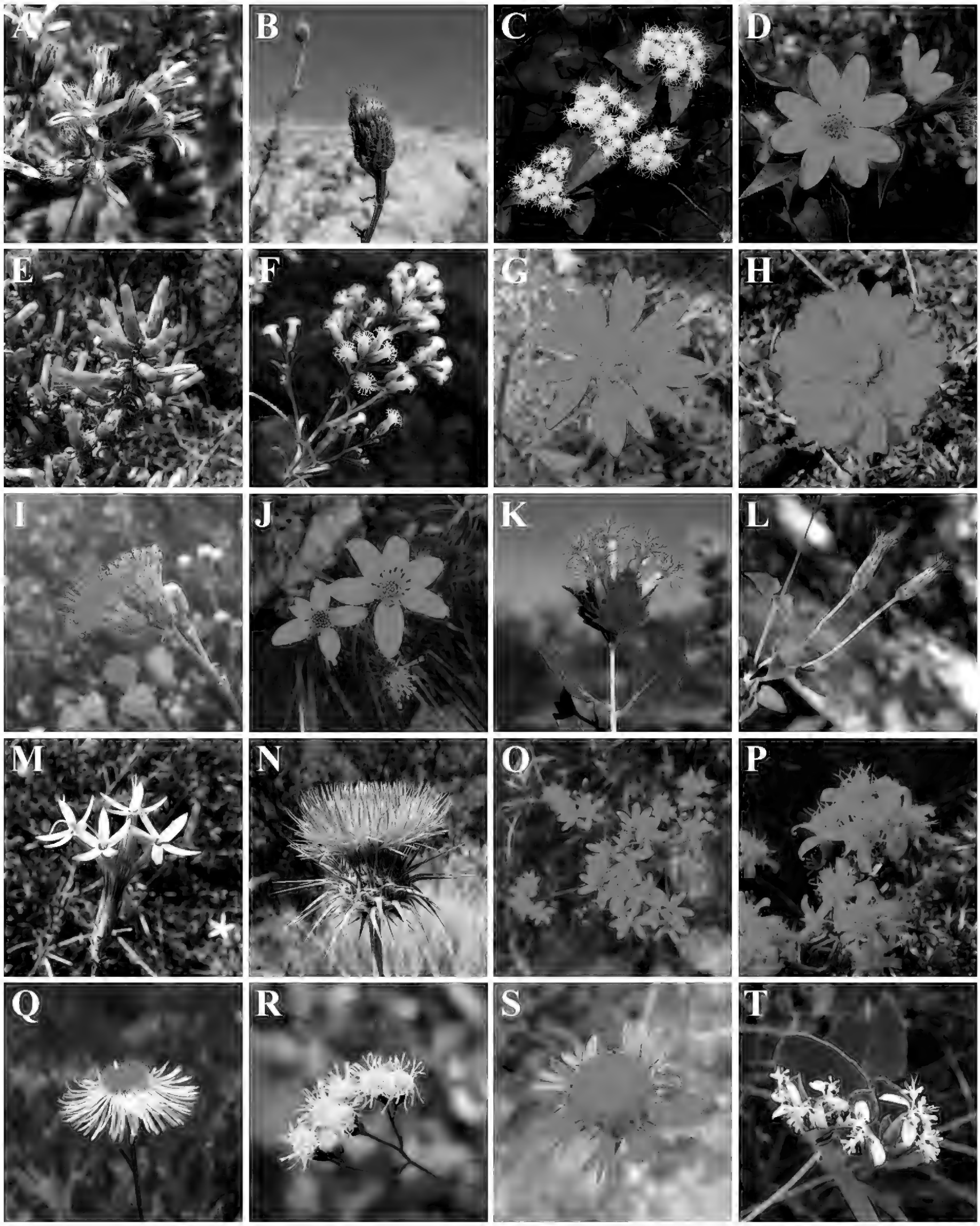

Figure 19. **EUDICOTS** cont. **Asteraceae**: (A) *Acourtia thurberi*; (B) *Adenophyllum porophyllum*; (C) *Ageratina herbacea*; (D) *Aldama cordifolia*; (E) *Baccharis pteronioides*; (F) *Baccharis thesioides*; (G) *Bahia absinthifolia*; (H) *Baileya multiradiata*; (I) *Bebbia juncea* var. *aspera*; (J) *Bidens aurea*; (K) *Brickellia baccharidea*; (L) *Brickellia coulteri* var. *brachiata*; (M) *Carphochaete bigelovii*; (N) *Cirsium neomexicanum*; (O) *Coreocarpus arizonicus*; (P) *Ericameria laricifolia*; (Q) *Erigeron arisolius*; (R) *Fleischmannia sonorae*; (S) *Gaillardia pinnatifida*; (T) *Guardiola platyphylla*.

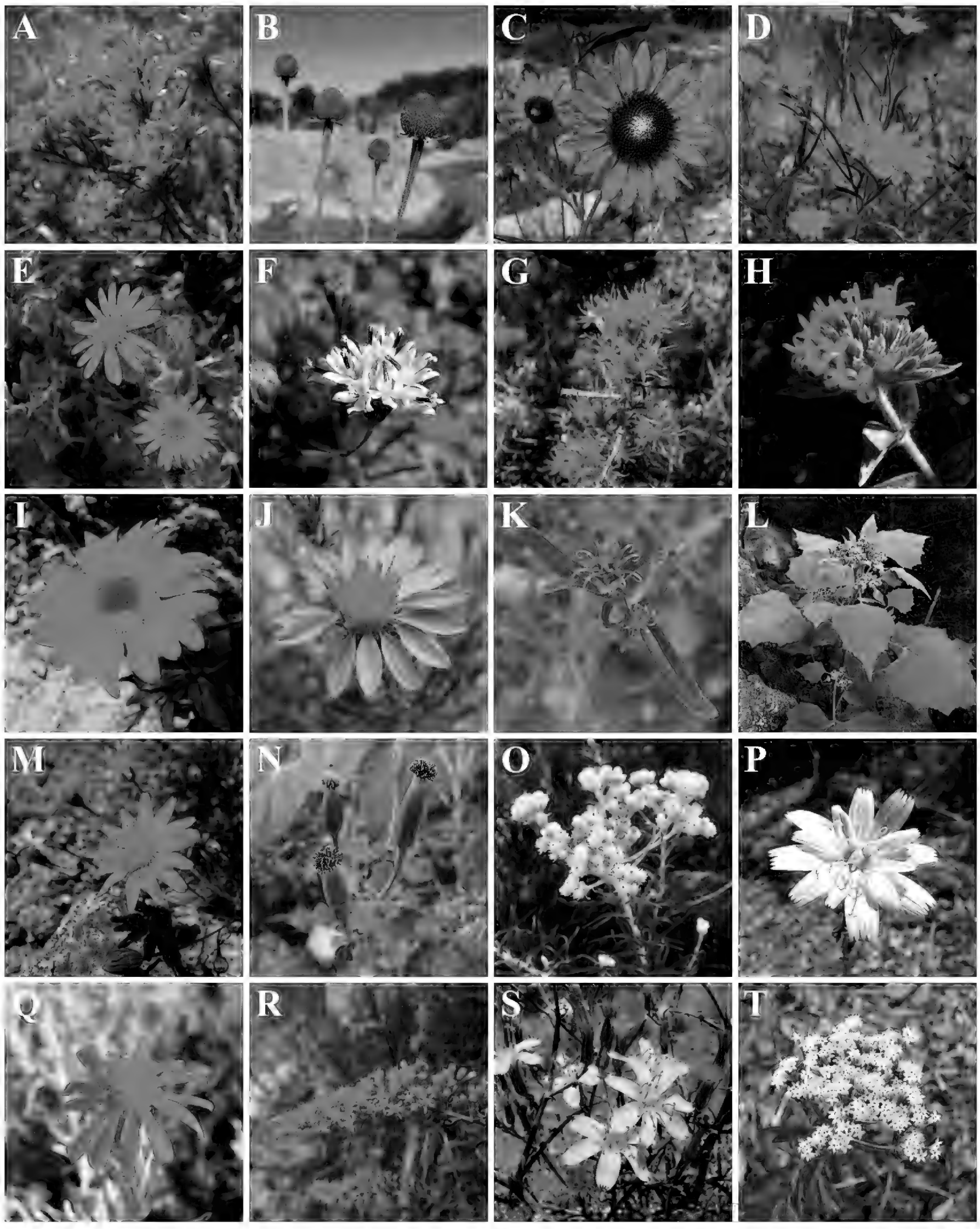

Figure 20. **EUDICOTS** cont. **Asteraceae**: (A) *Gutierrezia microcephala*; (B) *Helenium thurberi*; (C) *Helianthus petiolaris*; (D) *Heliomeris longifolia* var. *annua*; (E) *Heterotheca fulcrata* var. *senilis*; (F) *Hymenothrix wrightii*; (G) *Isocoma tenuisecta*; (H) *Lagascea decipiens*; (I) *Lasianthaea podocephala*; (J) *Machaeranthera tagetina*; (K) *Melampodium longicorne*; (L) *Parthenice mollis*; (M) *Pectis longipes*; (N) *Porophyllum ruderale* var. *macrocephalum*; (O) *Pseudognaphalium leucocephalum*; (P) *Rafinesquia neomexicana*; (Q) *Senecio flaccidus* var. *flaccidus*; (R) *Solidago velutina*; (S) *Stephanomeria tenuifolia*; (T) *Stevia serrata*.

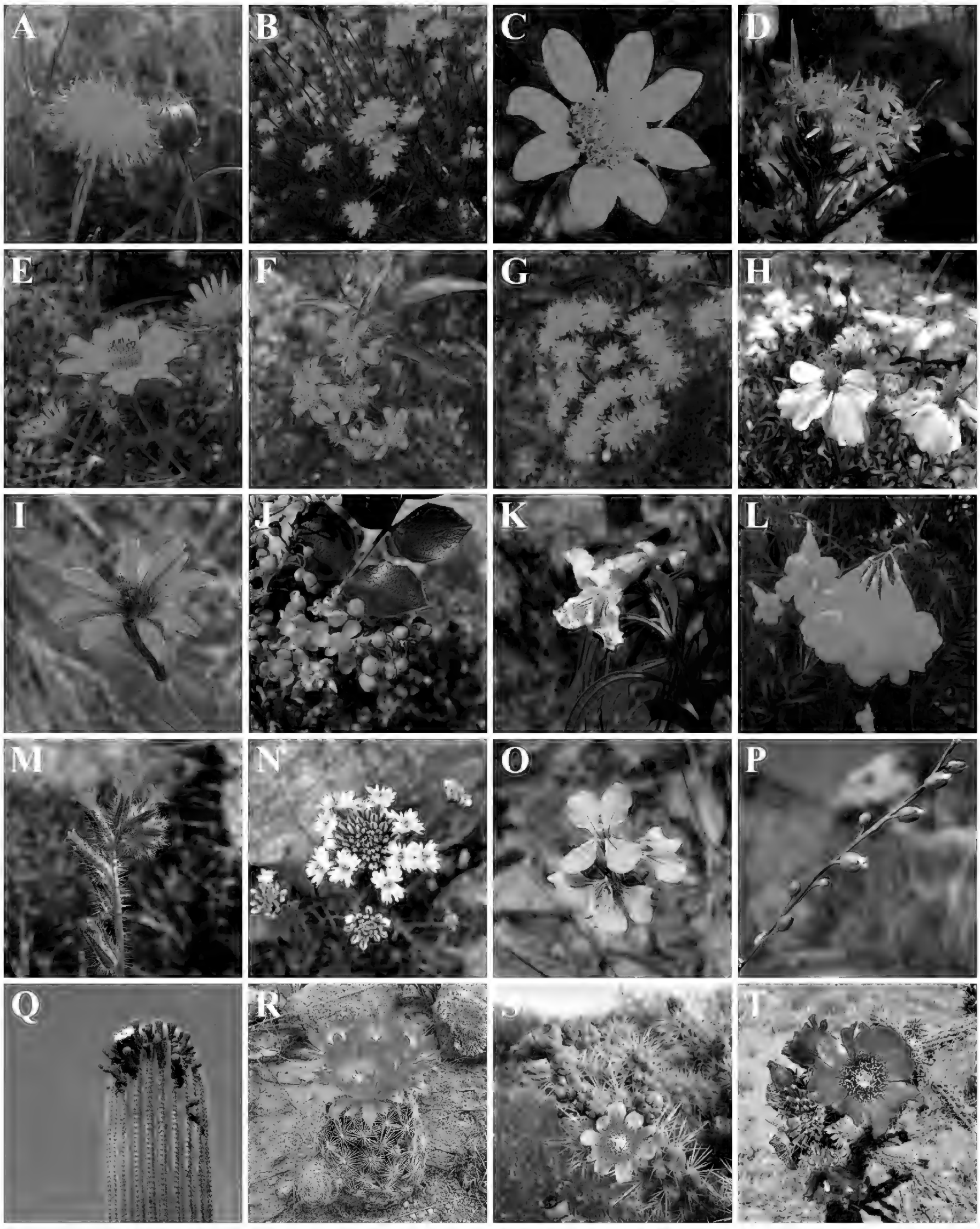

Figure 21. **EUDICOTS** cont. **Asteraceae**: (A) *Thelesperma megapotamicum*; (B) *Thymophylla pentachaeta* var. *belenidium*; (C) *Tithonia thurberi*; (D) *Trixis californica*; (E) *Verbesina longifolia*; (F) *Viguiera dentata* var. *lancifolia*; (G) *Xanthocephalum gymnospermoides*; (H) *Zinnia acerosa*; (I) *Zinnia peruviana*. **Berberidaceae**: (J) *Berberis wilcoxii*. **Bignoniaceae**: (K) *Chilopsis linearis* subsp. *arcuata*; (L) *Tecoma stans* var. *angustata*. **Boraginaceae**: (M) *Amsinckia intermedia*. **Brassicaceae**: (N) *Dryopetalon runcinatum*; (O) *Hesperidanthus linearifolius*; (P) *Pennellia micrantha*. **Cactaceae**: (Q) *Carnegiea gigantea*; (R) *Coryphantha vivipara* var. *bisbeeana*; (S) *Cylindropuntia fulgida* var. *mamillata*; (T) *Cylindropuntia spinosior*.

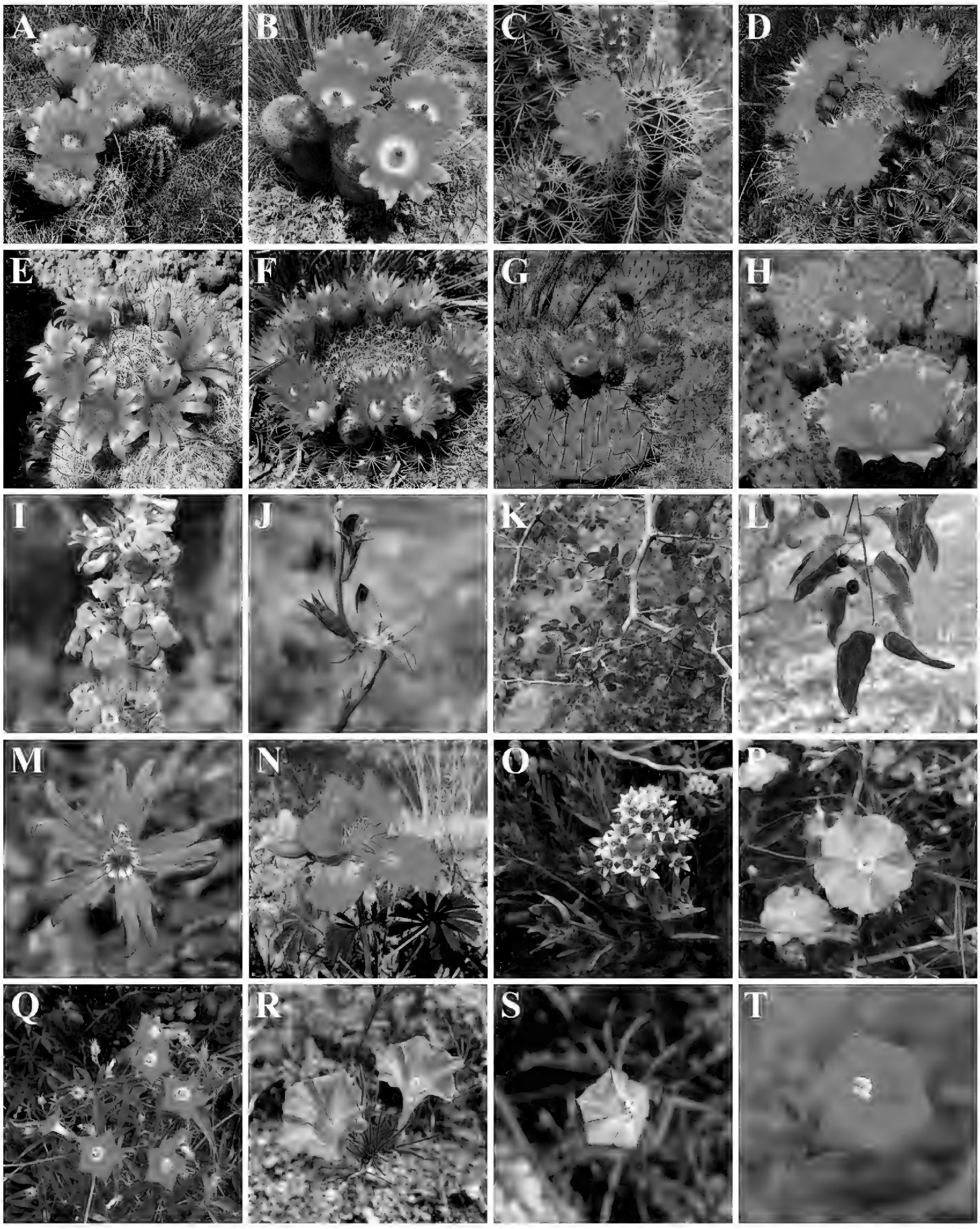

Figure 22. **EUDICOTS** cont. **Cactaceae**: (A) *Echinocereus fendleri*; (B) *Echinocereus rigidissimus*; (C) *Echinocereus santaritensis*; (D) *Ferocactus wislizeni*; (E) *Mammillaria grahamii*; (F) *Mammillaria macdougalii*; (G) *Opuntia engelmannii* var. *engelmannii*; (H) *Opuntia santarita*. **Campanulaceae**: (I) *Lobelia fenestralis*; (J) *Triodanis biflora*. **Cannabaceae**: (K) *Celtis pallida*; (L) *Celtis reticulata*. **Caryophyllaceae**: (M) *Silene laciniata*. **Cochlospermaceae**: (N) *Amoreuxia palmatifida*. **Comandraceae**: (O) *Comandra umbellata*. **Convolvulaceae**: (P) *Evolvulus arizonicus*; (Q) *Ipomoea barbatisepala*; (R) *Ipomoea capillacea*; (S) *Ipomoea costellata*; (T) *Ipomoea cristulata*.

Figure 23. **EUDICOTS** cont. **Convolvulaceae**: (A) *Ipomoea hederacea*; (B) *Ipomoea ternifolia* var. *leptotoma*; (C) *Ipomoea thurberi*. **Crassulaceae**: (D) *Graptopetalum bartramii*; (E) *Sedum cockerellii*. **Cucurbitaceae**: (F) *Apodanthera undulata*; (G) *Cucurbita digitata*; (H) *Echinopepon wrightii*; (I) *Marah gilensis*. **Ericaceae**: (J) *Arctostaphylos pungens*. **Euphorbiaceae**: (K) *Cnidoscolus angustidens*; (L) *Croton ciliatoglandulifer*; (M) *Euphorbia arizonica*; (N) *Euphorbia indivisa*; (O) *Jatropha macrorhiza*; (P) *Manihot angustiloba*; (Q) *Manihot davisiae*; (R) *Tragia nepetifolia*. **Fabaceae**: (S) *Acaciella angustissima*; (T) *Acmispon greenei*.

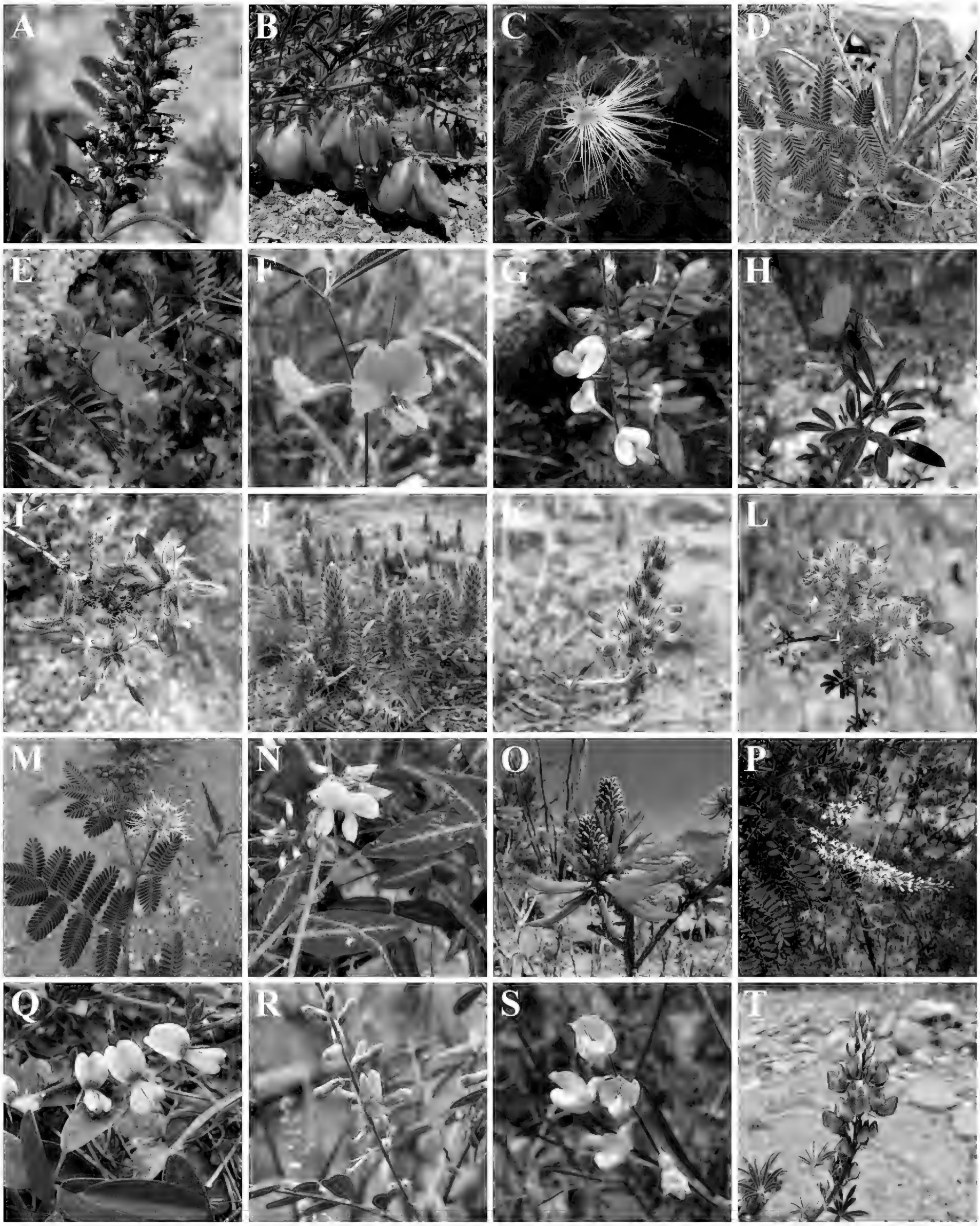

Figure 24. **EUDICOTS** cont. **Fabaceae**: (A) *Amorpha fruticosa*; (B) *Astragalus allochrous*; (C) *Calliandra eriophylla*; (D) *Calliandra humilis* var. *humilis*; (E) *Chamaecrista serpens* var. *wrightii*; (F) *Cologania angustifolia*; (G) *Coursetia caribaea* var. *sericea*; (H) *Crotalaria pumila*; (I) *Dalea formosa*; (J) *Dalea nana*; (K) *Dalea pogonathera*; (L) *Dalea pulchra*; (M) *Desmanthus cooleyi*; (N) *Desmodium batocaulon*; (O) *Erythrina flabelliformis*; (P) *Eysenhardtia orthocarpa*; (Q) *Galactia wrightii*; (R) *Indigofera sphaerocarpa*; (S) *Lathyrus graminifolius*; (T) *Lupinus sparsiflorus*.

Figure 25. **EUDICOTS** cont. **Fabaceae**: (A) *Macroptilium gibbosifolium*; (B) *Marina calycosa*; (C) *Mariosousa millefolia*; (D) *Mimosa aculeaticarpa* var. *biuncifera*; (E) *Mimosa dysocarpa*; (F) *Nissolia schottii*; (G) *Parkinsonia florida*; (H) *Pediomelum tenuiflorum*; (I) *Phaseolus ritensis*; (J) *Prosopis velutina*; (K) *Rhynchosia edulis*; (L) *Rhynchosia minima*; (M) *Senegalia greggii*; (N) *Senna bauhinioides*; (O) *Senna hirsuta* var. *glaberrima*; (P) *Tephrosia leiocarpa*; (Q) *Tephrosia tenella*; (R) *Vachellia constricta*; (S) *Zornia reticulata*. **Fagaceae**: (T) *Quercus arizonica*.

Figure 26. **EUDICOTS** cont. **Fagaceae**: (A) *Quercus emoryi*; (B) *Quercus oblongifolia*. **Fouquieriaceae**: (C) *Fouquieria splendens*. **Garryaceae**: (D) *Garrya wrightii*. **Gentianaceae**: (E) *Zeltnera arizonica*. **Heliotropiaceae**: (F) *Euploca procumbens*. **Hydrangeaceae**: (G) *Fendlera rupicola*; (H) *Philadelphus microphyllus*. **Hydrophyllaceae**: (I) *Phacelia sonoitensis*. **Juglandaceae**: (J) *Juglans major*. **Krameriaceae**: (K) *Krameria erecta*; (L) *Krameria lanceolata*. **Lamiaceae**: (M) *Clerodendrum coulteri*; (N) *Hedeoma dentata*; (O) *Monarda citriodora* subsp. *austromontana*; (P) *Salvia parryi*; (Q) *Stachys coccinea*; (R) *Trichostema arizonicum*. **Linaceae**: (S) *Linum puberulum*. **Loasaceae**: (T) *Mentzelia isolata*.

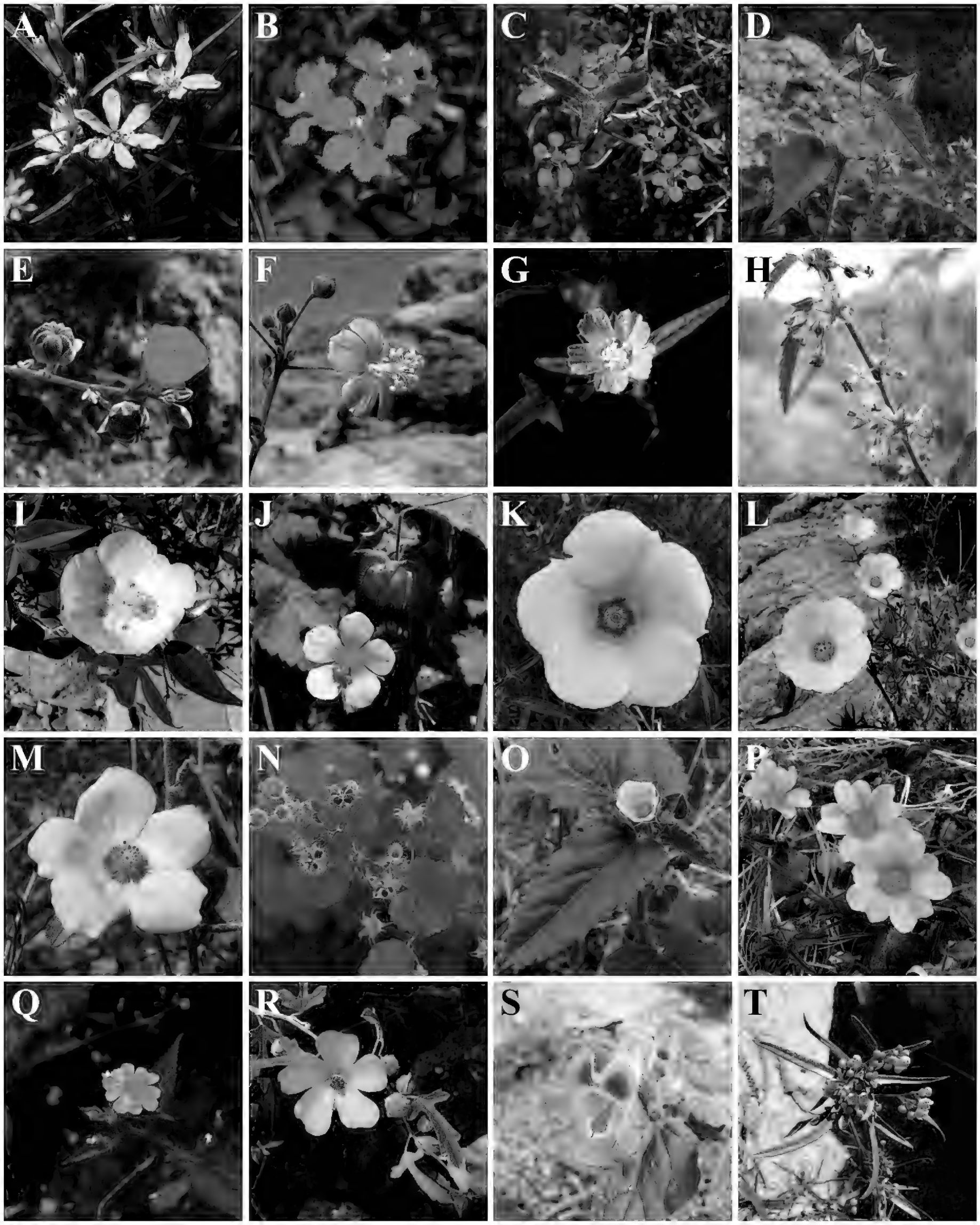

Figure 27. **EUDICOTS** cont. **Lythraceae**: (A) *Lythrum californicum*. **Malpighiaceae**: (B) *Aspicarpa hirtella*; (C) *Cottsia gracilis*. **Malvaceae**: (D) *Abutilon abutiloides*; (E) *Abutilon reventum*; (F) *Anoda abutiloides*; (G) *Anoda cristata*; (H) *Ayenia filiformis*; (I) *Gossypium thurberi*; (J) *Herissantia crispa*; (K) *Hibiscus biseptus*; (L) *Hibiscus coulteri*; (M) *Hibiscus denudatus*; (N) *Pseudabutilon thurberi*; (O) *Rhynchosida physocalyx*; (P) *Sida abutilifolia*; (Q) *Sida glabra*; (R) *Sphaeralcea laxa*. **Martyniaceae**: (S) *Proboscidea parviflora*. **Menispermaceae**: (T) *Cocculus diversifolius*.

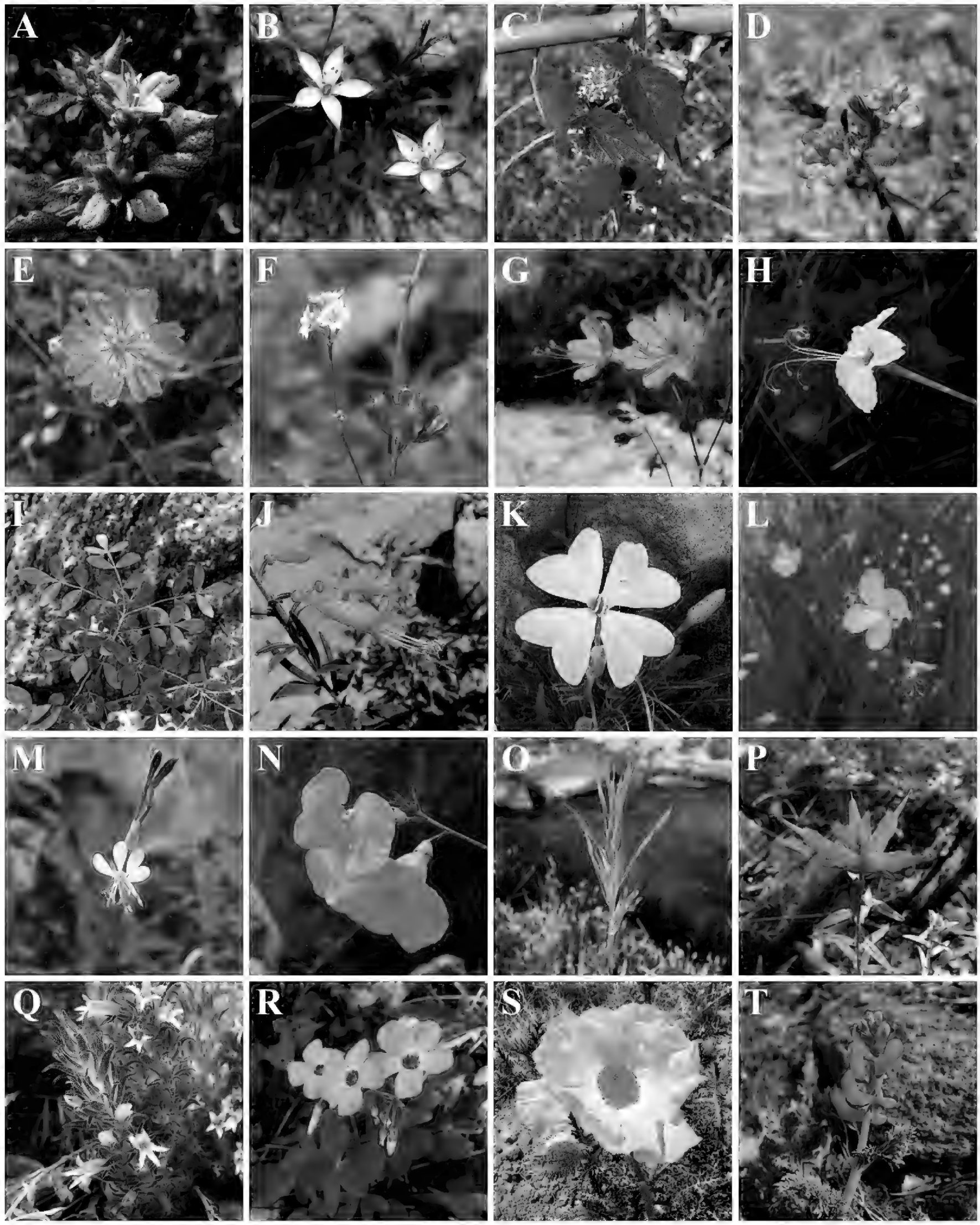

Figure 28. **EUDICOTS** cont. **Molluginaceae**: (A) *Glinus radiatus*. **Montiaceae**: (B) *Phemeranthus parviflorus*. **Moraceae**: (C) *Morus microphylla*. **Namaceae**: (D) *Nama hispida*. **Nyctaginaceae**: (E) *Allionia incarnata*; (F) *Boerhavia megaptera*; (G) *Mirabilis linearis*; (H) *Mirabilis longiflora*. **Oleaceae**: (I) *Fraxinus gooddingii*. **Onagraceae**: (J) *Epilobium canum* var. *latifolium*; (K) *Oenothera caespitosa*; (L) *Oenothera platanorum*; (M) *Oenothera podocarpa*. **Orobanchaceae**: (N) *Brachystigma wrightii*; (O) *Castilleja minor* var. *minor*; (P) *Castilleja tenuiflora*; (Q) *Orobanche cooperi* subsp. *cooperi*. **Oxalidaceae**: (R) *Oxalis latifolia*. **Papaveraceae**: (S) *Argemone pleiacantha*; (T) *Corydalis aurea* subsp. *occidentalis*.

Figure 29. **EUDICOTS** cont. **Papaveraceae**: (A) *Eschscholzia californica* subsp. *mexicana*. **Passifloraceae**: (B) *Passiflora mexicana*. **Petiveriaceae**: (C) *Rivina humilis*. **Phrymaceae**: (D) *Erythranthe guttata*. **Plantaginaceae**: (E) *Maurandella antirrhiniflora*; (F) *Mecardonia procumbens*; (G) *Penstemon barbatus*; (H) *Penstemon parryi*; (I) *Stemodia durantifolia*. **Plumbaginaceae**: (J) *Plumbago zeylanica*. **Polemoniaceae**: (K) *Ipomopsis thurberi*; (L) *Loeselia glandulosa*. **Polygalaceae**: (M) *Hebecarpa barbeyana*. **Polygonaceae**: (N) *Eriogonum abertianum*. **Portulacaceae**: (O) *Portulaca suffrutescens*. **Ranunculaceae**: (P) *Anemone tuberosa*; (Q) *Clematis drummondii*; (R) *Delphinium scaposum*. **Rhamnaceae**: (S) *Condalia correllii*; (T) *Sarcomphalus obtusifolius*.

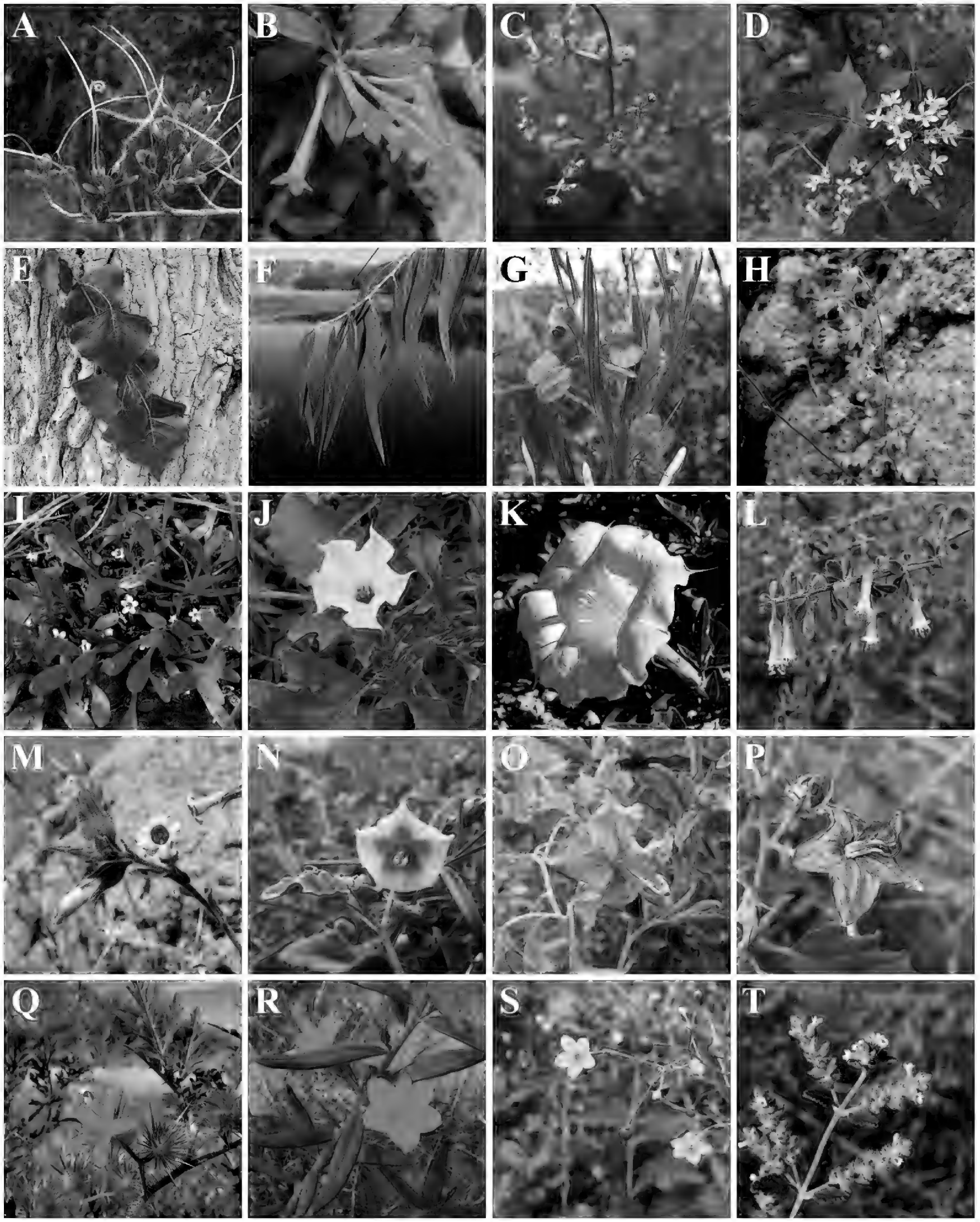

Figure 30. **EUDICOTS** cont. **Rosaceae**: (A) *Cercocarpus breviflorus*. **Rubiaceae**: (B) *Bouvardia ternifolia*; (C) *Galium wrightii*. **Rutaceae**: (D) *Ptelea trifoliata*. **Salicaceae**: (E) *Populus fremontii*; (F) *Salix gooddingii*. **Sapindaceae**: (G) *Dodonaea viscosa*. **Saxifragaceae**: (H) *Heuchera sanguinea*. **Scrophulariaceae**: (I) *Limosella acaulis*. **Solanaceae**: (J) *Datura quercifolia*; (K) *Datura wrightii*; (L) *Lycium exsertum*; (M) *Nicotiana obtusifolia*; (N) *Physalis hederifolia*; (O) *Solanum elaeagnifolium*; (P) *Solanum houstonii*; (Q) *Solanum lumholtzianum*. **Talinaceae**: (R) *Talinum aurantiacum*; (S) *Talinum paniculatum*. **Verbenaceae**: (T) *Aloysia wrightii*.

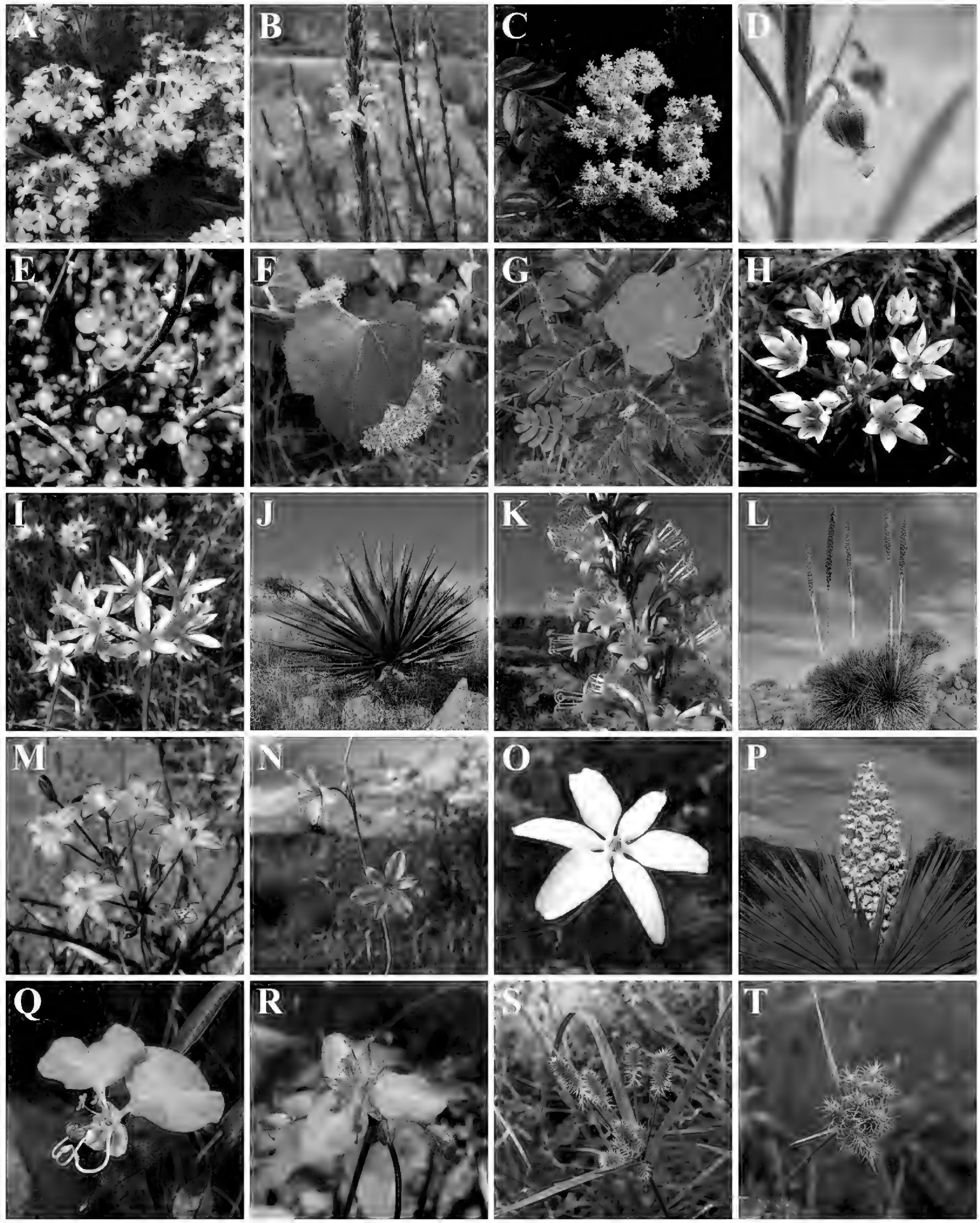

Figure 31. **EUDICOTS** cont. **Verbenaceae**: (A) *Glandularia latilobata*; (B) *Verbena xylopoda*. **Viburnaceae**: (C) *Sambucus cerulea*. **Violaceae**: (D) *Hybanthus verticillatus*. **Viscaceae**: (E) *Phoradendron californicum*. **Vitaceae**: (F) *Vitis arizonica*. **Zygophyllaceae**: (G) *Kallstroemia grandiflora*. **MONOCOTS**. **Amaryllidaceae**: (H) *Allium rhizomatum*; (I) *Nothoscordum bivalve*. **Asparagaceae**: (J) *Agave palmeri*; (K) *Agave schottii* var. *schottii*; (L) *Dasylirion wheeleri*; (M) *Dipterostemon capitatus* subsp. *pauciflorus*; (N) *Echeandia flavescens*; (O) *Milla biflora*; (P) *Yucca* cf. *schottii*. **Commelinaceae**: (Q) *Commelina erecta*; (R) *Tradescantia pinetorum*. **Cyperaceae**: (S) *Cyperus hermaphroditus*; (T) *Fuirena simplex* var. *aristulata*.

Figure 32. **MONOCOTS** cont. **Juncaceae**: (A) *Juncus mexicanus*; (B) *Juncus torreyi*. **Liliaceae**: (C) *Calochortus ambiguus*; (D) *Calochortus kennedyi*. **Poaceae**: (E) *Bothriochloa barbinodis*; (F) *Bouteloua chondrosioides*; (G) *Bouteloua curtipendula*; (H) *Digitaria californica*; (I) *Digitaria insularis*; (J) *Diplachne fusca* subsp. *fascicularis*; (K) *Heteropogon contortus*; (L) *Hilaria belangeri*; (M) *Leptochloa crinita*; (N) *Melinis repens*; (O) *Muhlenbergia dumosa*; (P) *Muhlenbergia rigida*; (Q) *Paspalum distichum*; (R) *Setaria macrostachya*. **Pontederiaceae**: (S) *Heteranthera limosa*. **Typhaceae**: (T) *Typha domingensis*.

DIVERSITY IN A GRASSLAND: FLORA OF THE SALERO RANCH

Sue Carnahan lives in rural Santa Cruz County and is an Associated Researcher with the University of Arizona Herbarium in Tucson. Her current projects include a flora of the Santa Rita Mountains with James Verrier and Iris Rodden, a flora of Coal Mine Canyon in Santa Cruz County, and a flora of the Guaymas region of Sonora, Mexico, with Richard Felger and Jesús Sánchez-Escalante. Photo by Curtis Smith.

Salero Ranch Image Gallery

Scrub grassland with *Bothriochloa barbinodis*, Salero Ranch, 24 September 2013.

This gallery of 840 images is a supplement to the flora of Salero Ranch in central Santa Cruz County, Arizona. Images are organized by major groups (Pteridophytes, Gymnosperms, Magnoliids, Eudicots, Monocots) and then alphabetically by family, genus, and species. More information about the study area, including maps, history, floristics, and an annotated checklist can be accessed at https://canotia.org/volumes/vol16/SaleroRanchFlora.pdf.

All photographs by Susan D. Carnahan.

Salero Ranch Image Gallery, a supplement to: Diversity in a Grassland: Flora of the Salero Ranch, Santa Cruz County, Arizona. Canotia 16: 1–43. 2020.

SALERO RANCH IMAGE GALLERY

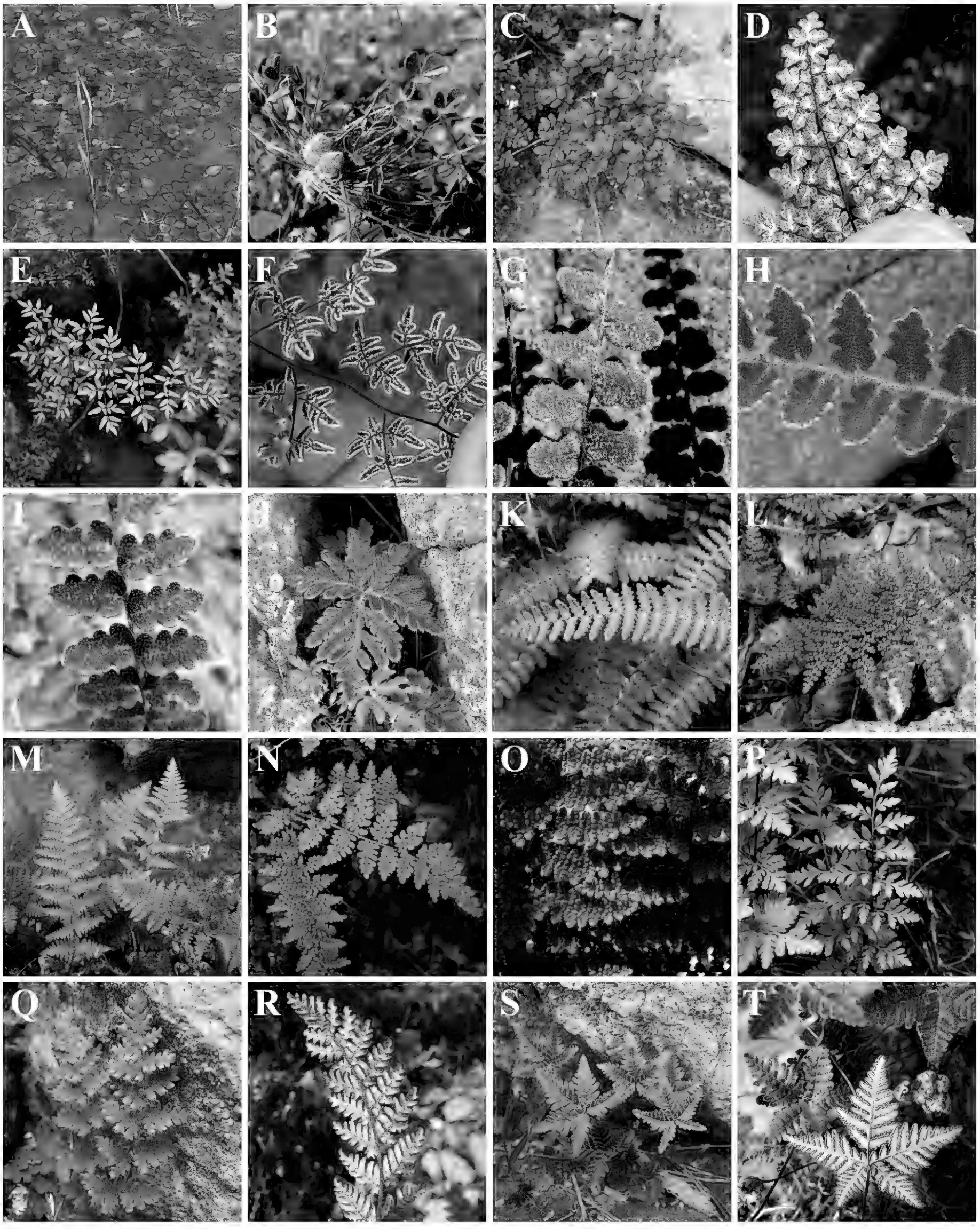

Figure 1. **PTERIDOPHYTES**. **Marsileaceae**: (A & B) *Marsilea mollis*. **Pteridaceae**: (C & D) *Argyrochosma incana*; (E & F) *Argyrochosma limitanea* subsp. *limitanea*; (G) *Astrolepis integerrima*; (H) *Astrolepis sinuata*; (I) *Astrolepis windhamii*; (J) *Bommeria hispida*; (K) *Myriopteris aurea*; (L) *Myriopteris fendleri*; (M) *Myriopteris lindheimeri*; (N) *Myriopteris rufa*; (O) *Myriopteris wootonii*; (P) *Myriopteris wrightii*; (Q & R) *Notholaena grayi*; (S & T) *Notholaena standleyi*.

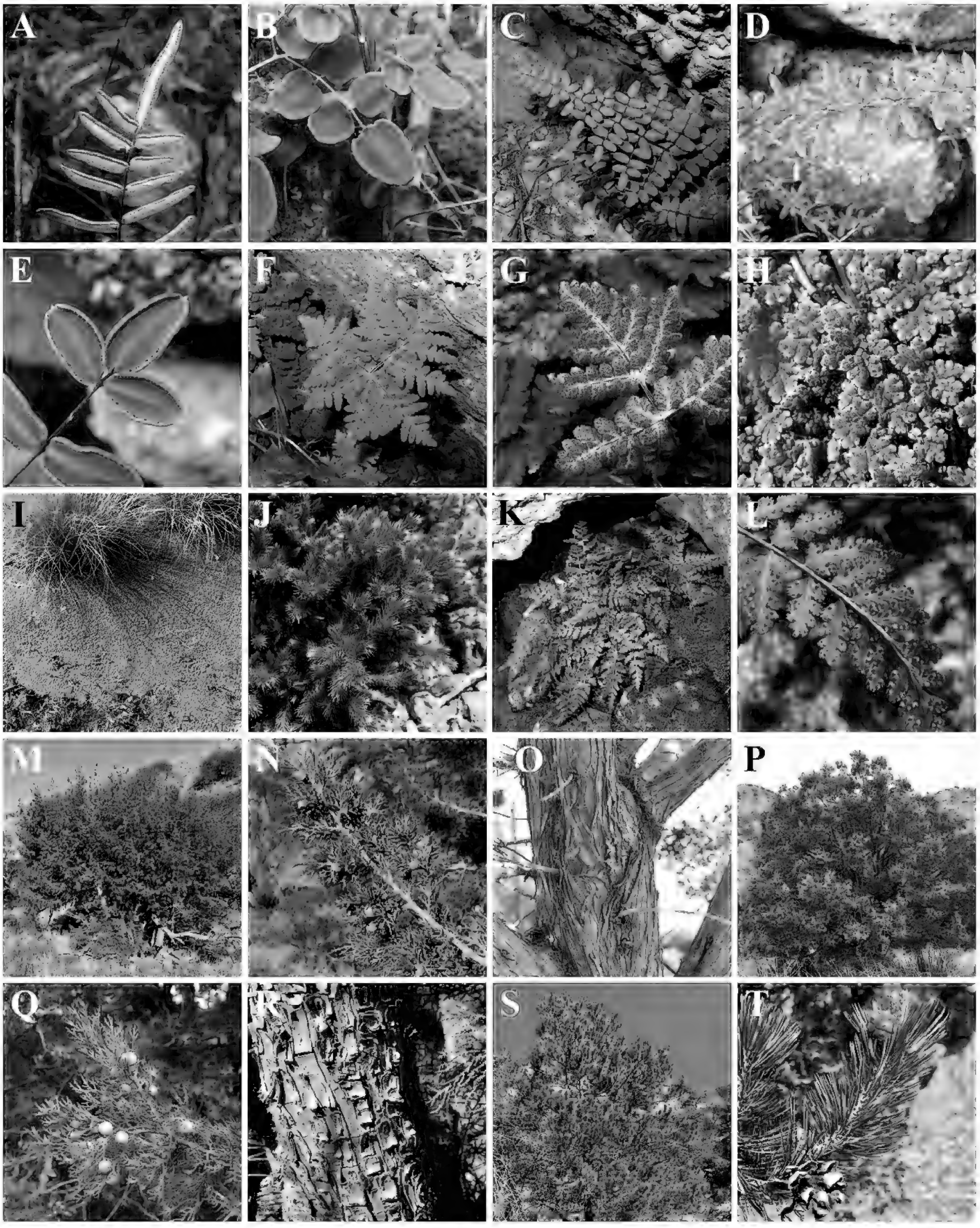

Figure 2. **PTERIDOPHYTES** cont. **Pteridaceae**: (A) *Pellaea atropurpurea*; (B) *Pellaea intermedia*; (C) *Pellaea truncata*; (D & E) *Pellaea wrightiana*; (F & G) *Pentagramma triangularis* subsp. *maxonii*. **Salviniaceae**: (H & I) *Azolla filiculoides*. **Selaginellaceae**: (J) *Selaginella rupincola*. **Woodsiaceae**: (K & L) *Woodsia cochisensis*. **GYMNOSPERMS**. **Cupressaceae**: (M–O) *Juniperus arizonica*; (P–R) *Juniperus deppeana*. **Pinaceae**: (S & T) *Pinus discolor*.

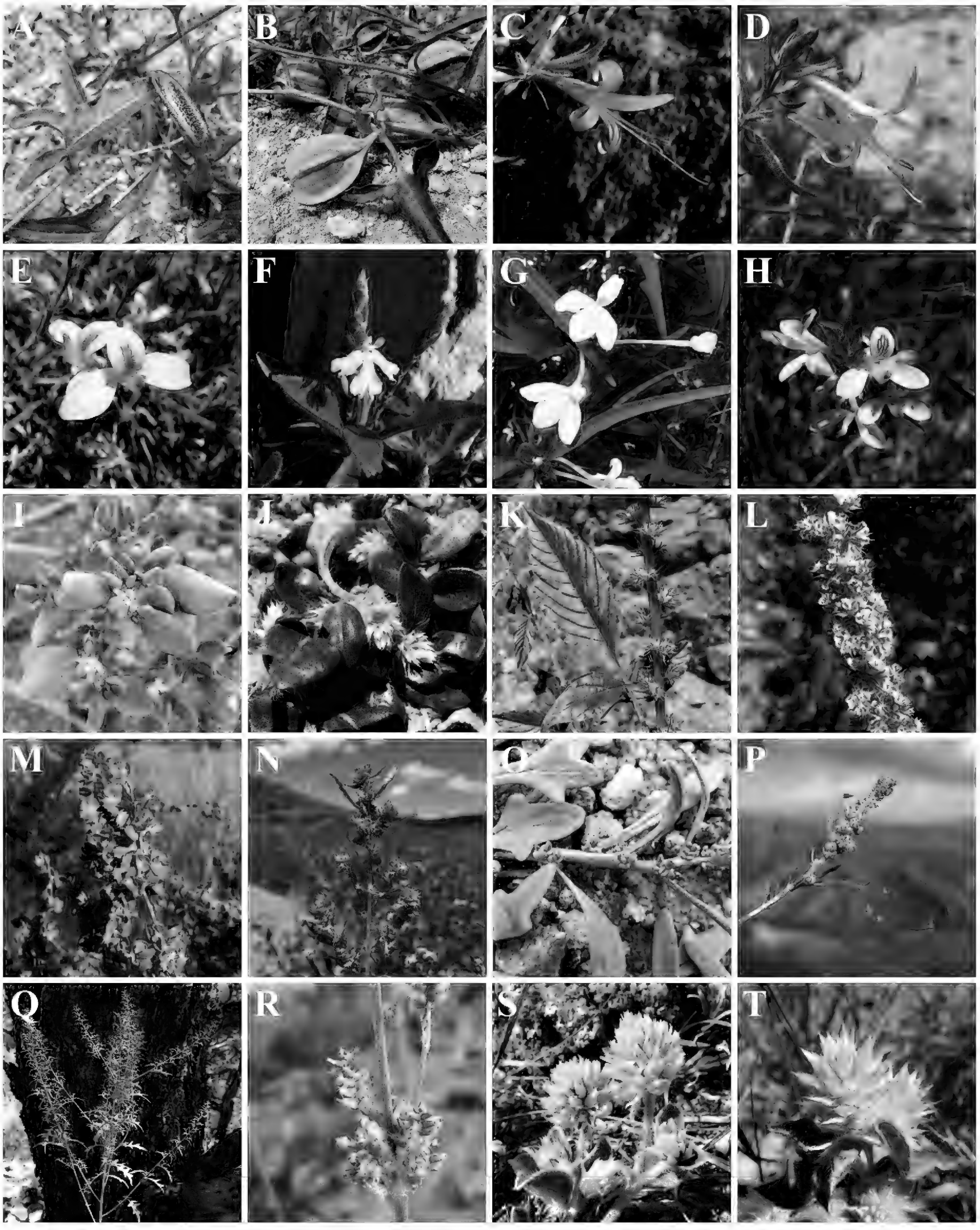

Figure 3. **MAGNOLIIDS**. **Aristolochiaceae**: (A & B) *Aristolochia watsonii*. **EUDICOTS**. **Acanthaceae**: (C & D) *Anisacanthus thurberi*; (E) *Carlowrightia arizonica*; (F) *Elytraria imbricata*; (G) *Justicia longii*; (H) *Tetramerium nervosum*. **Aizoaceae**: (I) *Trianthema portulacastrum*. **Amaranthaceae**: (J) *Alternanthera caracasana*; (K) *Amaranthus palmeri*; (L) *Amaranthus torreyi*; (M) *Atriplex canescens*; (N) *Atriplex elegans*; (O) *Blitum nuttallianum*; (P) *Chenopodium arizonicum*; (Q) *Dysphania graveolens*; (R) *Froelichia arizonica*; (S) *Gomphrena caespitosa*; (T) *Gomphrena nitida*.

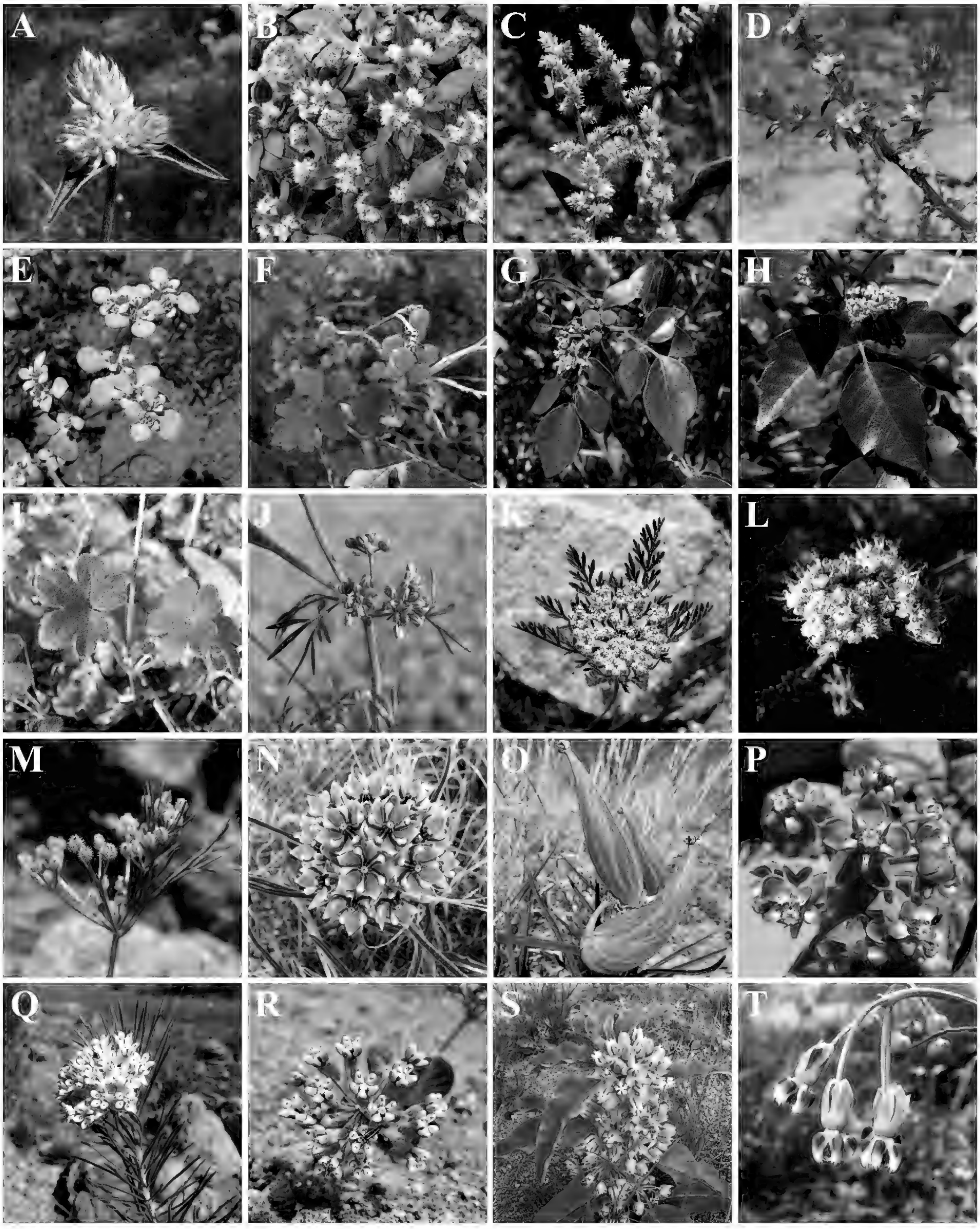

Figure 4. **EUDICOTS** cont. **Amaranthaceae**: (A) *Gomphrena sonorae*; (B) *Guilleminea densa*; (C) *Iresine heterophylla*; (D) *Salsola tragus*; (E) *Tidestromia lanuginosa*. **Anacardiaceae**: (F) *Rhus aromatica* var. *trilobata*; (G) *Rhus virens* var. *choriophylla*; (H) *Toxicodendron radicans*. **Apiaceae**: (I) *Bowlesia incana*; (J) *Cyclospermum leptophyllum*; (K) *Daucus pusillus*; (L) *Lomatium nevadense* var. *parishii*; (M) *Spermolepis lateriflora*. **Apocynaceae**: (N & O) *Asclepias asperula*; (P) *Asclepias elata*; (Q) *Asclepias linaria*; (R) *Asclepias nummularia*; (S) *Asclepias nyctaginifolia*; (T) *Asclepias quinquedentata*.

Figure 5. **EUDICOTS** cont. **Apocynaceae**: (A) *Asclepias subverticillata*; (B) *Cynanchum ligulatum*; (C) *Funastrum crispum*; (D) *Funastrum heterophyllum*; (E & F) *Gonolobus arizonicus*; (G) *Haplophyton cimicidum*; (H) *Mandevilla brachysiphon*; (I) *Metastelma mexicanum*; (J & K) *Polystemma* sp. **Araliaceae**: (L & M) *Aralia humilis*. **Asteraceae**: (N) *Acourtia nana*; (O) *Acourtia thurberi*; (P) *Acourtia wrightii*; (Q) *Adenophyllum porophyllum*; (R) *Ageratina herbacea*; (S) *Ageratina paupercula*; (T) *Ageratina thyrsiflora*.

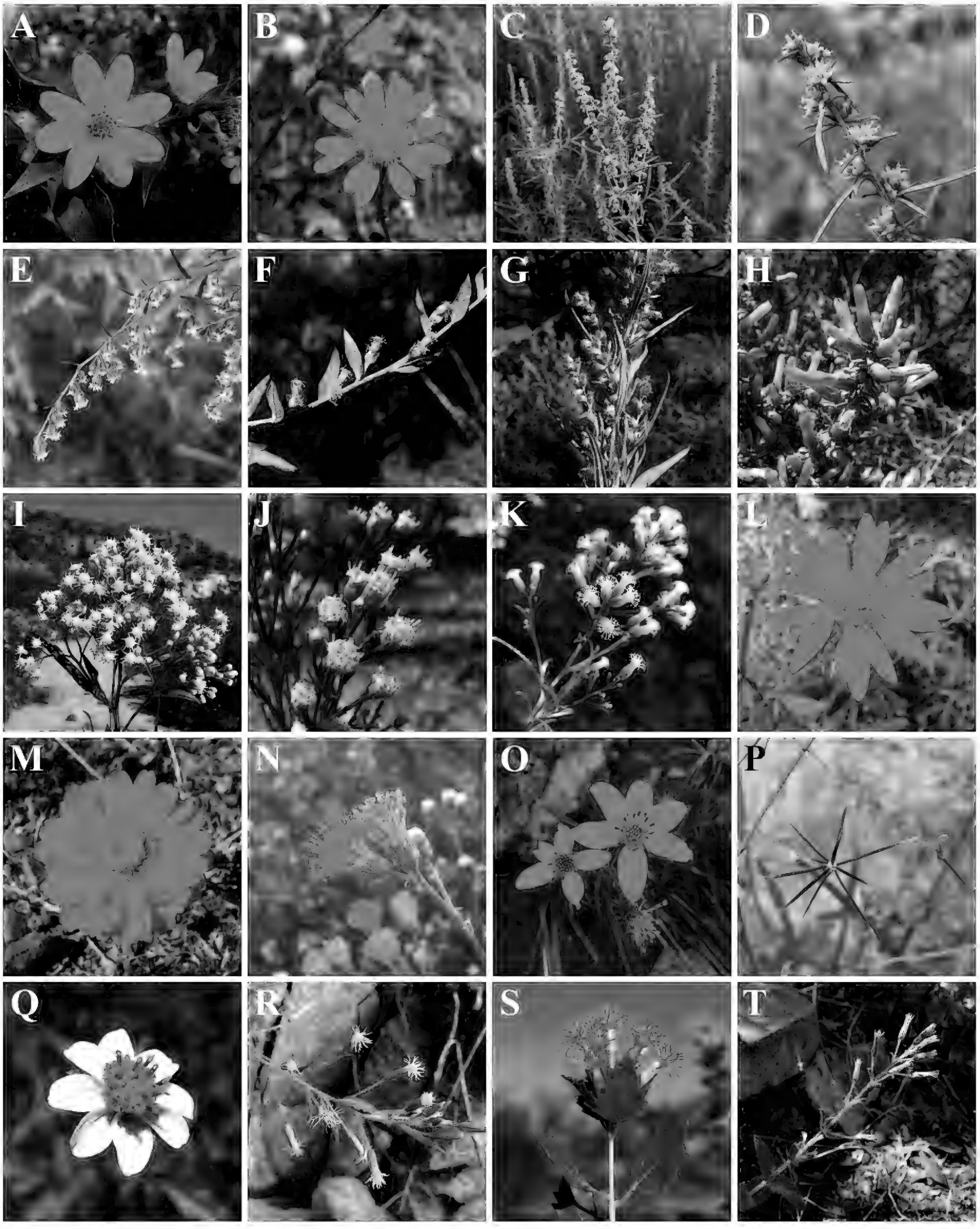

Figure 6. **EUDICOTS** cont. **Asteraceae**: (A) *Aldama cordifolia*; (B) *Amauriopsis dissecta*; (C) *Ambrosia confertiflora*; (D) *Ambrosia monogyra*; (E) *Artemisia dracunculus*; (F) *Artemisia ludoviciana* subsp. *ludoviciana*; (G) *Artemisia ludoviciana* subsp. *mexicana*; (H) *Baccharis pteronioides*; (I) *Baccharis salicifolia*; (J) *Baccharis sarothroides*; (K) *Baccharis thesioides*; (L) *Bahia absinthifolia*; (M) *Baileya multiradiata*; (N) *Bebbia juncea* var. *aspera*; (O) *Bidens aurea*; (P) *Bidens leptocephala*; (Q) *Bidens pilosa*; (R) *Brickellia amplexicaulis*; (S) *Brickellia baccharidea*; (T) *Brickellia betonicifolia*.

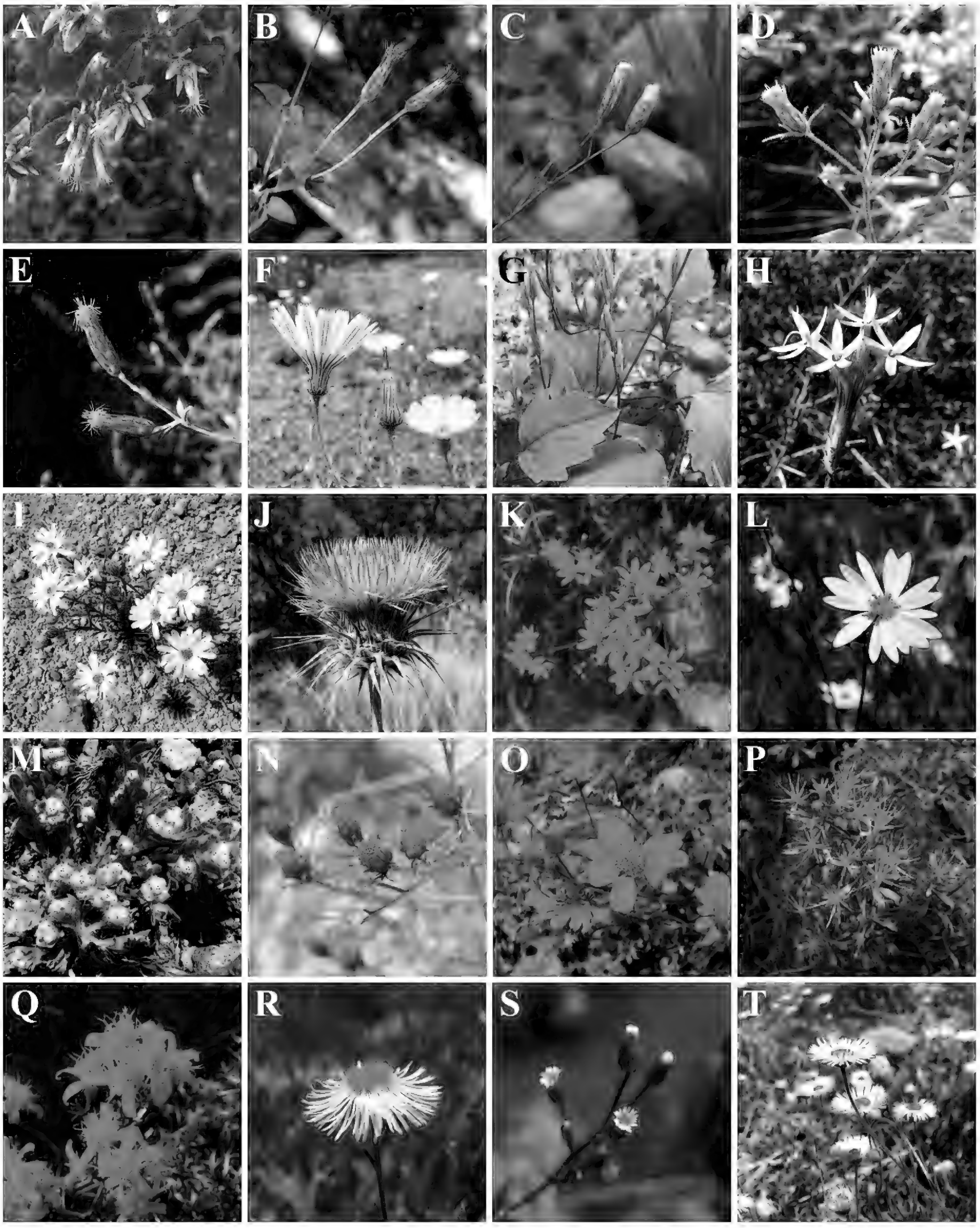

Figure 7. **EUDICOTS** cont. **Asteraceae**: (A) *Brickellia californica*; (B) *Brickellia coulteri* var. *brachiata*; (C) *Brickellia eupatorioides* var. *chlorolepis*; (D) *Brickellia floribunda*; (E) *Brickellia venosa*; (F) *Calycoseris wrightii*; (G) *Carminatia tenuiflora*; (H) *Carphochaete bigelovii*; (I) *Chaetopappa ericoides*; (J) *Cirsium neomexicanum*; (K) *Coreocarpus arizonicus*; (L) *Cosmos parviflorus*; (M) *Diaperia verna*; (N) *Dyssodia papposa*; (O) *Encelia farinosa*; (P) *Ericameria cuneata* var. *spathulata*; (Q) *Ericameria laricifolia*; (R) *Erigeron arisolius*; (S) *Erigeron canadensis*; (T) *Erigeron divergens*.

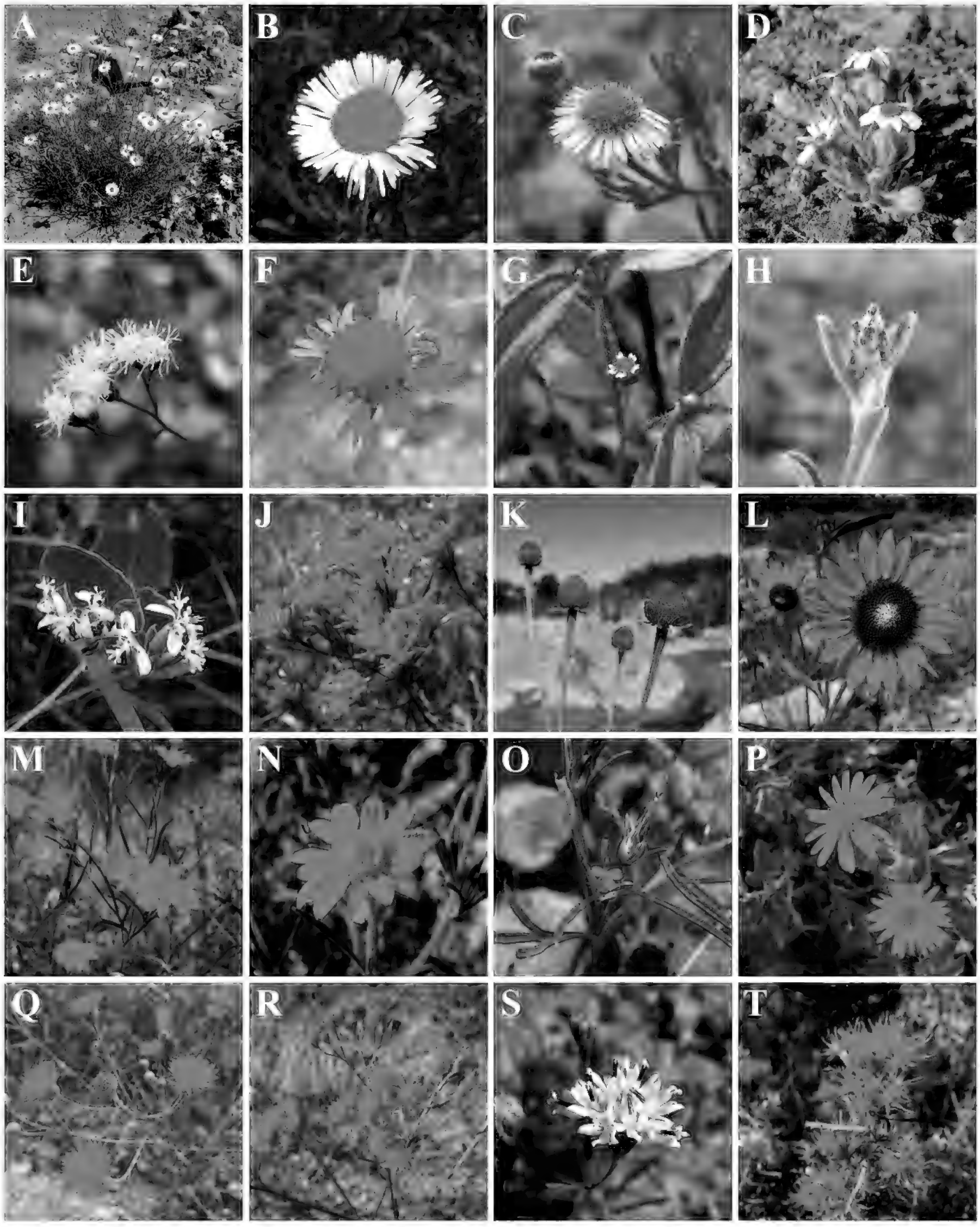

Figure 8. **EUDICOTS** cont. **Asteraceae**: (A) *Erigeron incomptus*; (B) *Erigeron neomexicanus*; (C) *Erigeron sceptrifer*; (D) *Eriophyllum lanosum*; (E) *Fleischmannia sonorae*; (F) *Gaillardia pinnatifida*; (G) *Galinsoga parviflora* var. *semicalva*; (H) *Gamochaeta stagnalis*; (I) *Guardiola platyphylla*; (J) *Gutierrezia microcephala*; (K) *Helenium thurberi*; (L) *Helianthus petiolaris*; (M) *Heliomeris longifolia* var. *annua*; (N) *Heliomeris multiflora*; (O) *Heterosperma pinnatum*; (P) *Heterotheca fulcrata* var. *senilis*; (Q) *Heterotheca subaxillaris* var. *latifolia*; (R) *Hymenothrix wislizeni*; (S) *Hymenothrix wrightii*; (T) *Isocoma tenuisecta*.

Figure 9. **EUDICOTS** cont. **Asteraceae**: (A) *Koanophyllon palmeri*; (B) *Lactuca serriola*; (C) *Laennecia sophiifolia*; (D) *Lagascea decipiens*; (E) *Lasianthaea podocephala*; (F) *Logfia filaginoides*; (G) *Machaeranthera tagetina*; (H) *Machaeranthera tanacetifolia*; (I) *Malacothrix fendleri*; (J) *Malacothrix glabrata*; (K) *Malacothrix stebbinsii*; (L) *Melampodium longicorne*; (M) *Melampodium strigosum*; (N) *Packera neomexicana*; (O) *Parthenice mollis*; (P) *Pectis cylindrica*; (Q) *Pectis filipes*; (R) *Pectis longipes*; (S) *Pectis prostrata*; (T) *Porophyllum gracile*.

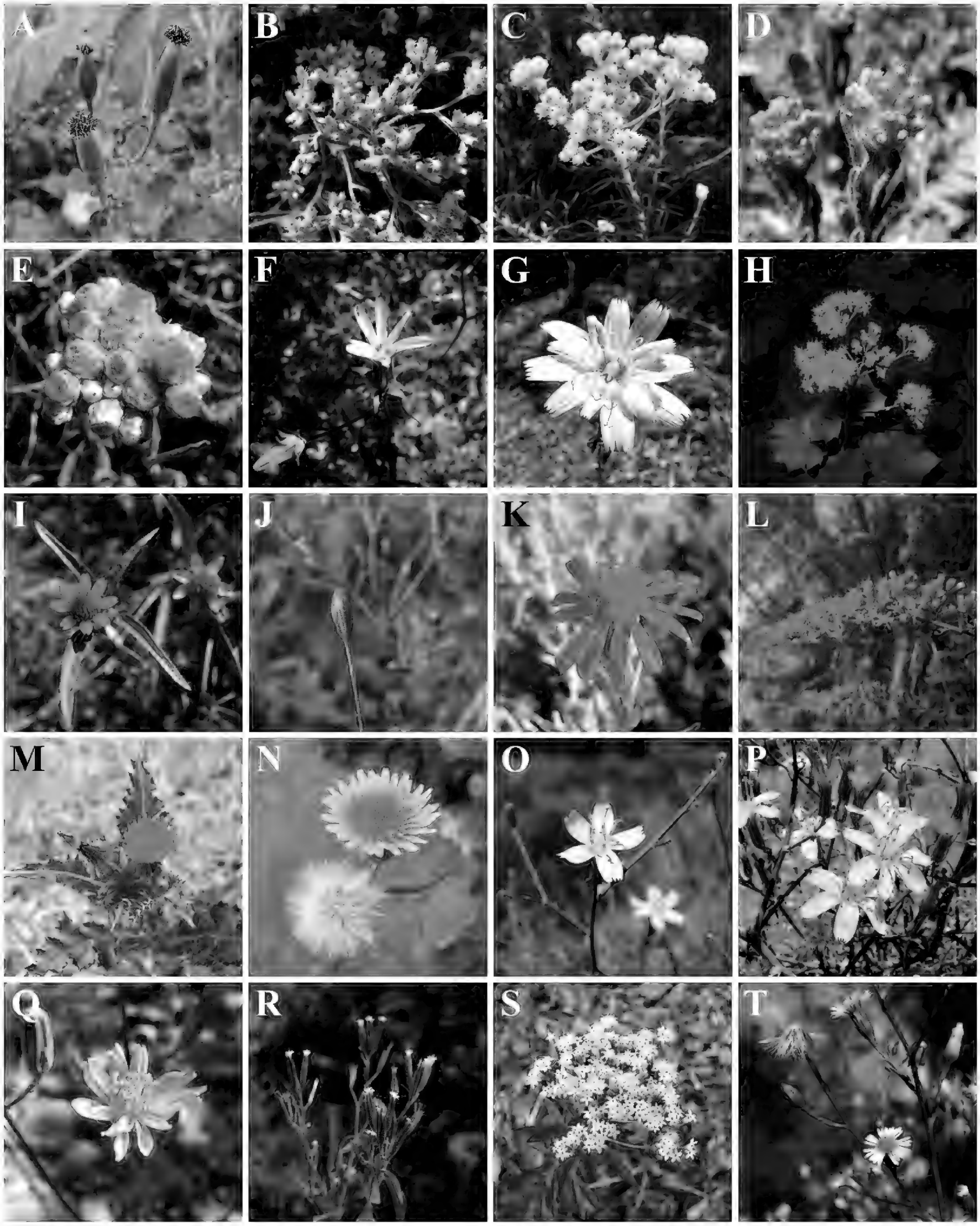

Figure 10. **EUDICOTS** cont. **Asteraceae**: (A) *Porophyllum ruderale* var. *macrocephalum*; (B) *Pseudognaphalium canescens*; (C) *Pseudognaphalium leucocephalum*; (D) *Pseudognaphalium luteoalbum*; (E) *Pseudognaphalium stramineum*; (F) *Rafinesquia californica*; (G) *Rafinesquia neomexicana*; (H) *Roldana hartwegii*; (I) *Sanvitalia abertii*; (J) *Schkuhria pinnata*; (K) *Senecio flaccidus* var. *flaccidus*; (L) *Solidago velutina*; (M) *Sonchus asper*; (N) *Sonchus oleraceus*; (O) *Stephanomeria pauciflora*; (P) *Stephanomeria tenuifolia*; (Q) *Stephanomeria thurberi*; (R) *Stevia micrantha*; (S) *Stevia serrata*; (T) *Symphyotrichum subulatum* var. *parviflorum*.

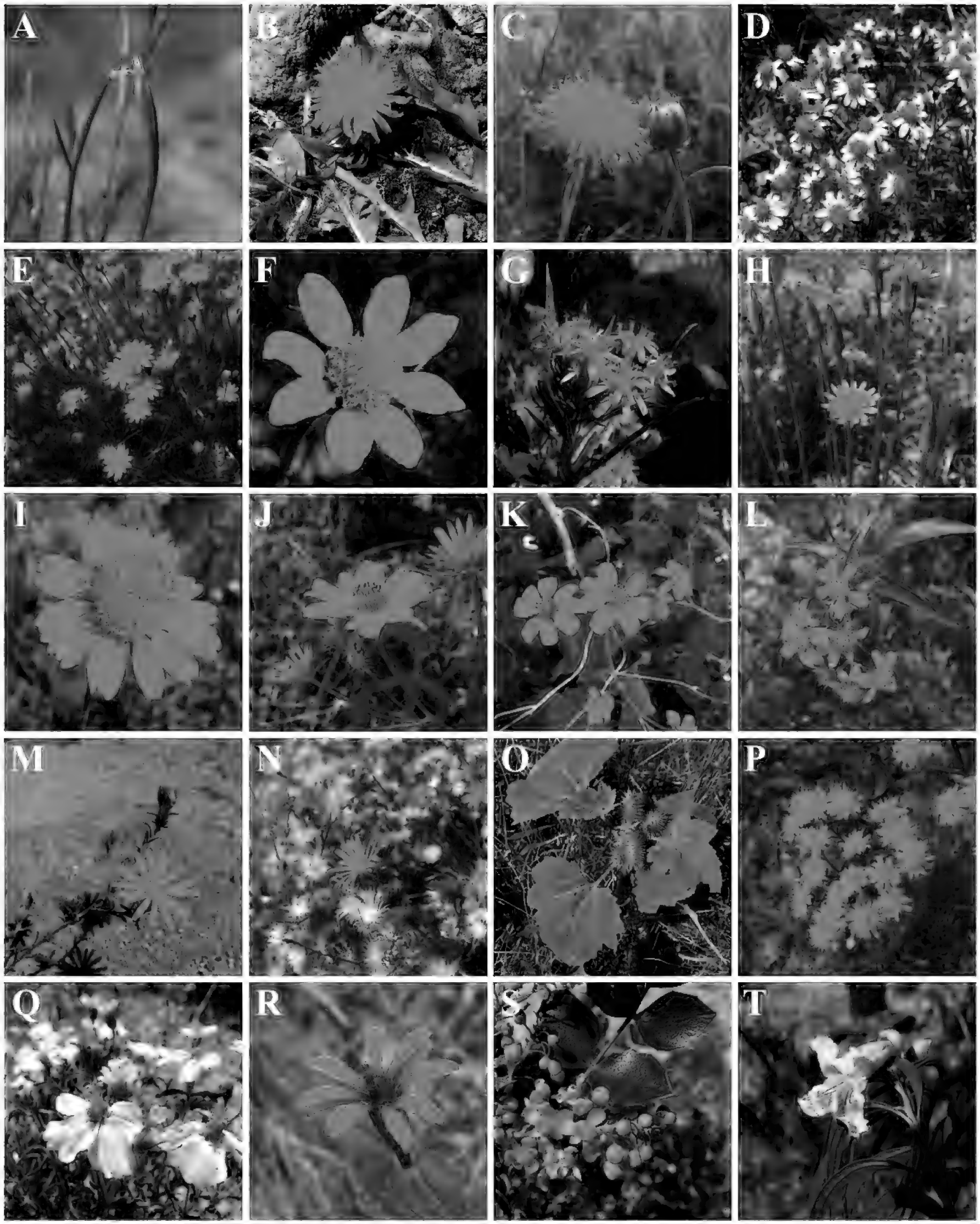

Figure 11. **EUDICOTS** cont. **Asteraceae**: (A) *Tagetes micrantha*; (B) *Taraxacum officinale*; (C) *Thelesperma megapotamicum*; (D) *Thymophylla concinna*; (E) *Thymophylla pentachaeta* var. *belenidium*; (F) *Tithonia thurberi*; (G) *Trixis californica*; (H) *Uropappus lindleyi*; (I) *Verbesina encelioides*; (J) *Verbesina longifolia*; (K) *Viguiera dentata* var. *dentata*; (L) *Viguiera dentata* var. *lancifolia*; (M) *Xanthisma gracile*; (N) *Xanthisma spinulosum*; (O) *Xanthium strumarium*; (P) *Xanthocephalum gymnospermoides*; (Q) *Zinnia acerosa*; (R) *Zinnia peruviana.* **Berberidaceae**: (S) *Berberis wilcoxii*. **Bignoniaceae**: (T) *Chilopsis linearis* subsp. *arcuata*.

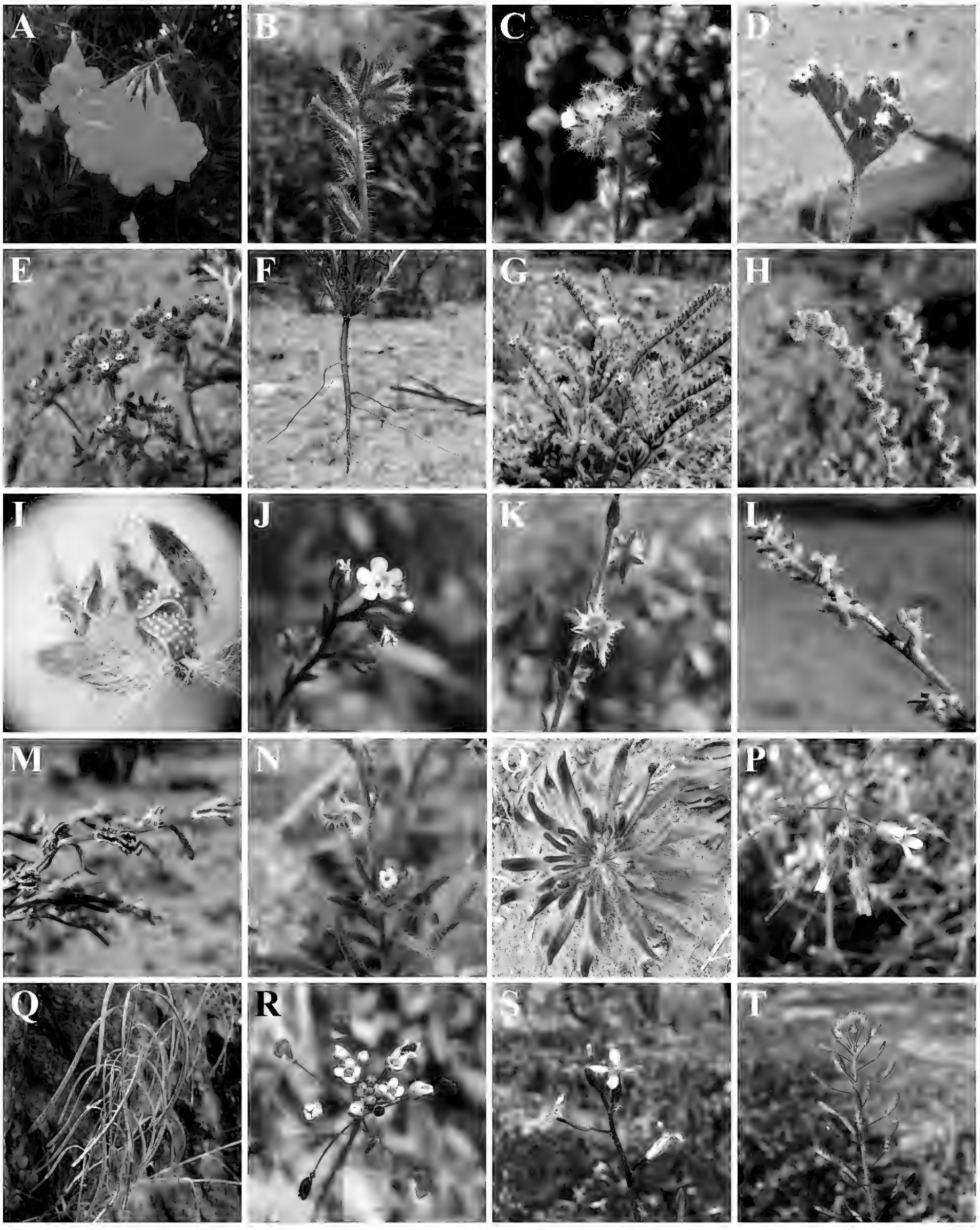

Figure 12. **EUDICOTS** cont. **Bignoniaceae**: (A) *Tecoma stans* var. *angustata*. **Boraginaceae**: (B) *Amsinckia intermedia*; (C) *Cryptantha barbigera*; (D) *Cryptantha pterocarya*; (E & F) *Eremocarya micrantha*; (G) *Johnstonella angustifolia*; (H & I) *Johnstonella pusilla*; (J & K) *Lappula occidentalis*; (L) *Pectocarya heterocarpa*; (M) *Pectocarya platycarpa*; (N) *Pectocarya recurvata*; (O) *Plagiobothrys arizonicus*. **Brassicaceae**: (P & Q) *Boechera perennans*; (R) *Capsella bursa-pastoris*; (S) *Chorispora tenella*; (T) *Descurainia pinnata*.

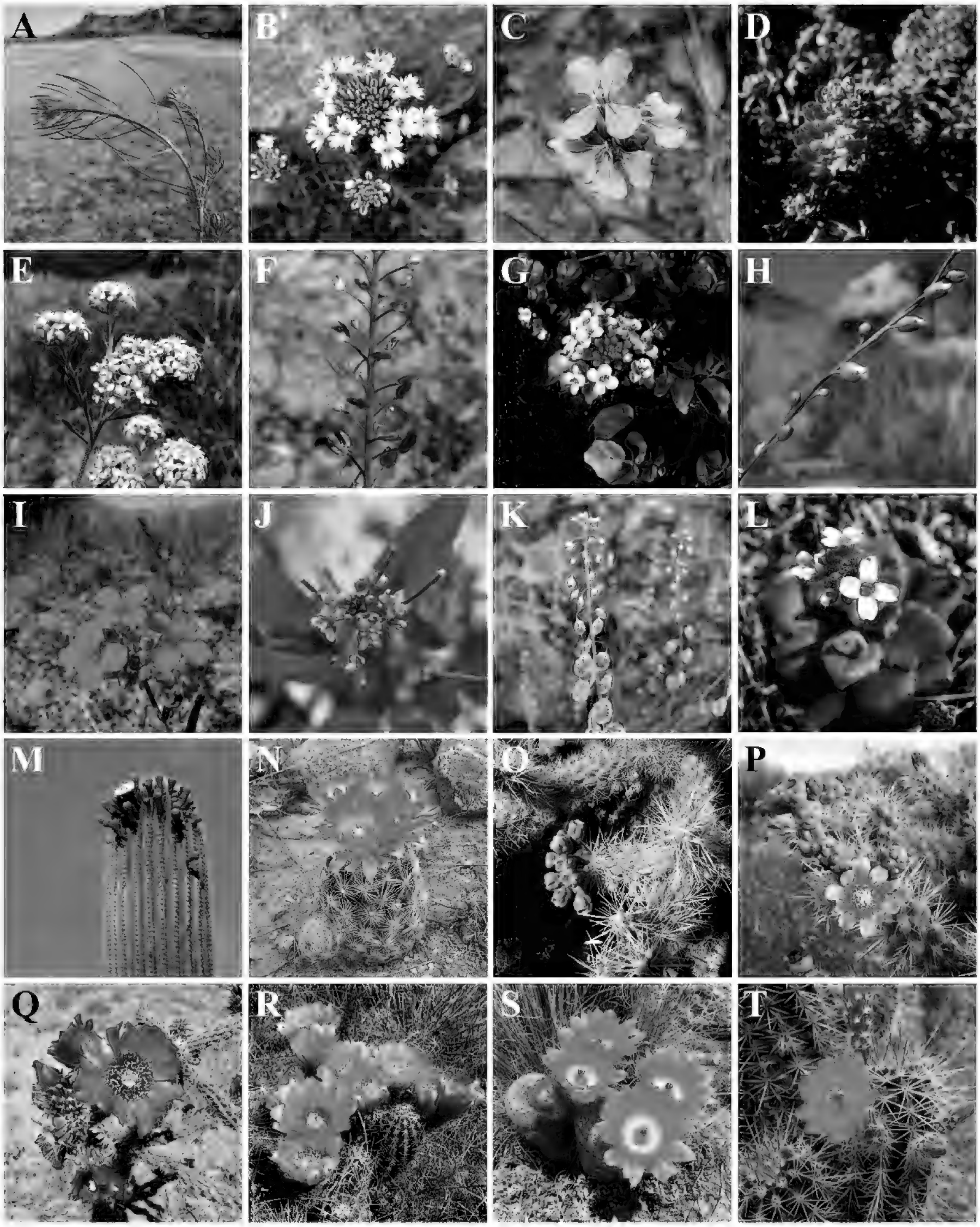

Figure 13. **EUDICOTS** cont. **Brassicaceae**: (A) *Descurainia sophia*; (B) *Dryopetalon runcinatum*; (C) *Hesperidanthus linearifolius*; (D) *Lepidium oblongum*; (E) *Lepidium thurberi*; (F) *Lepidium virginicum*; (G) *Nasturtium officinale*; (H) *Pennellia micrantha*; (I) *Physaria gordonii*; (J) *Sisymbrium irio*; (K) *Thysanocarpus curvipes*; (L) *Tomostima cuneifolia*. **Cactaceae**: (M) *Carnegiea gigantea*; (N) *Coryphantha vivipara* var. *bisbeeana*; (O) *Cylindropuntia fulgida* var. *fulgida*; (P) *Cylindropuntia fulgida* var. *mamillata*; (Q) *Cylindropuntia spinosior*; (R) *Echinocereus fendleri*; (S) *Echinocereus rigidissimus*; (T) *Echinocereus santaritensis*.

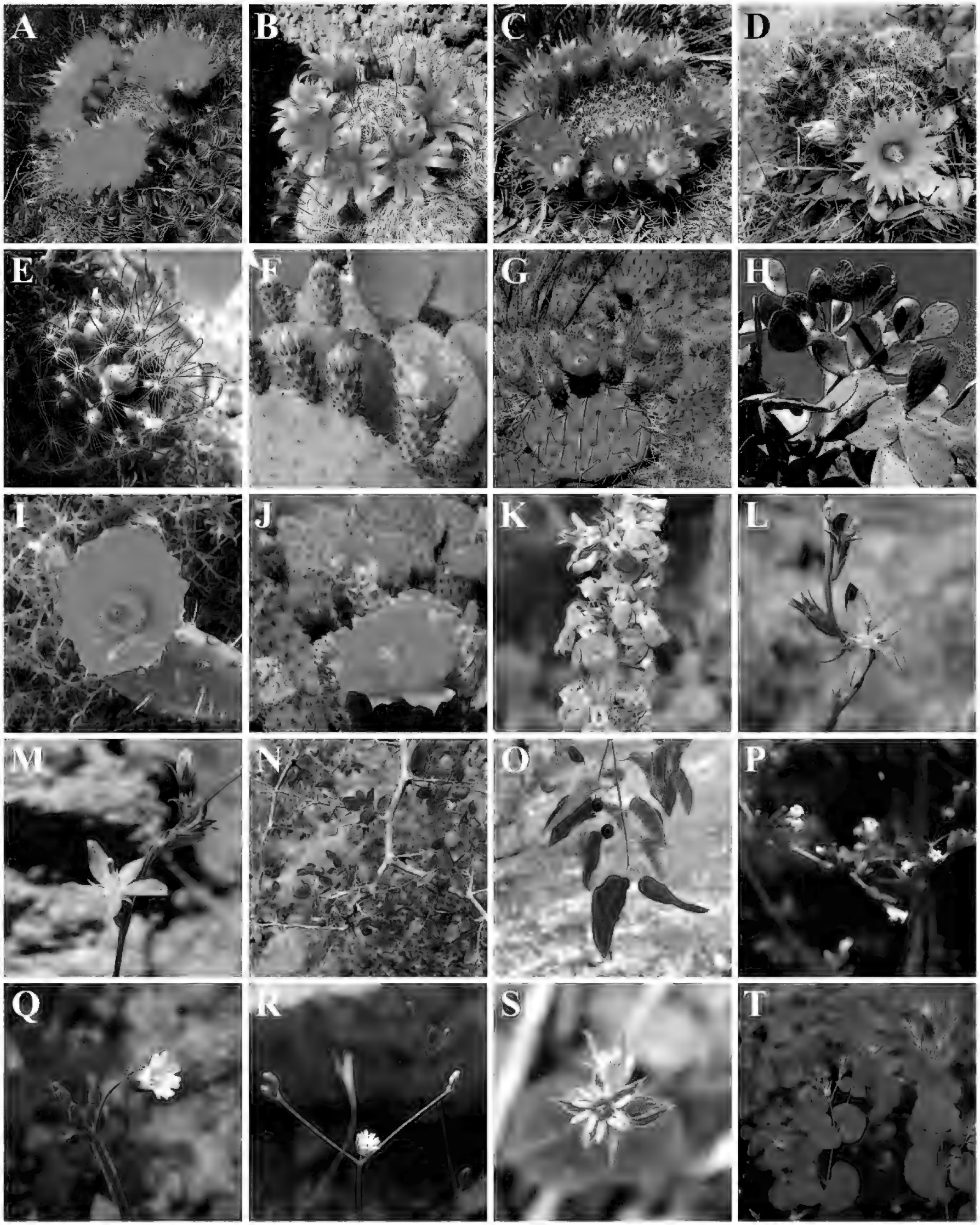

Figure 14. **EUDICOTS** cont. **Cactaceae**: (A) *Ferocactus wislizeni*; (B) *Mammillaria grahamii*; (C) *Mammillaria macdougalii*; (D & E) *Mammillaria wrightii* var. *wilcoxii*; (F) *Opuntia chlorotica*; (G) *Opuntia engelmannii* var. *engelmannii*; (H) *Opuntia engelmannii* var. *laevis*; (I) *Opuntia phaeacantha*; (J) *Opuntia santarita*. **Campanulaceae**: (K) *Lobelia fenestralis*; (L) *Triodanis biflora*; (M) *Triodanis holzingeri*. **Cannabaceae**: (N) *Celtis pallida*; (O) *Celtis reticulata*. **Caprifoliaceae**: (P) *Valeriana sorbifolia*. **Caryophyllaceae**: (Q) *Cerastium texanum*; (R) *Drymaria depressa*; (S & T) *Drymaria glandulosa*.

Figure 15. **EUDICOTS** cont. **Caryophyllaceae**: (A) *Drymaria molluginea*; (B) *Herniaria hirsuta* var. *cinerea*; (C) *Loeflingia squarrosa*; (D) *Silene antirrhina*; (E) *Silene laciniata*. **Cleomaceae**: (F) *Polanisia dodecandra* subsp. *trachysperma*. **Cochlospermaceae**: (G) *Amoreuxia palmatifida*. **Comandraceae**: (H) *Comandra umbellata*. **Convolvulaceae**: (I) *Convolvulus equitans*; (J) *Cuscuta chinensis* var. *applanata*; (K) *Cuscuta erosa*; (L) *Evolvulus alsinoides*; (M) *Evolvulus arizonicus*; (N) *Evolvulus nuttallianus*; (O) *Evolvulus sericeus*; (P) *Ipomoea barbatisepala*; (Q) *Ipomoea capillacea*; (R) *Ipomoea costellata*; (S) *Ipomoea cristulata*; (T) *Ipomoea hederacea*.

Figure 16. **EUDICOTS** cont. **Convolvulaceae**: (A) *Ipomoea muricata*; (B) *Ipomoea ternifolia* var. *leptotoma*; (C) *Ipomoea thurberi*. **Crassulaceae**: (D) *Crassula connata*; (E & F) *Graptopetalum bartramii*; (G) *Sedum cockerellii*. **Cucurbitaceae**: (H) *Apodanthera undulata*; (I) *Cucurbita digitata*; (J) *Cucurbita foetidissima*; (K) *Echinopepon wrightii*; (L & M) *Marah gilensis*; (N) *Sicyosperma gracile*. **Ericaceae**: (O) *Arctostaphylos pungens*. **Euphorbiaceae**: (P) *Acalypha neomexicana*; (Q) *Acalypha ostryifolia*; (R) *Argythamnia serrata*; (S) *Cnidoscolus angustidens*; (T) *Croton ciliatoglandulifer*.

Figure 17. **EUDICOTS** cont. **Euphorbiaceae**: (A) *Croton pottsii*; (B) *Euphorbia albomarginata*; (C) *Euphorbia arizonica*; (D) *Euphorbia bilobata*; (E) *Euphorbia capitellata*; (F) *Euphorbia cuphosperma*; (G) *Euphorbia exstipulata*; (H) *Euphorbia florida*; (I) *Euphorbia heterophylla*; (J) *Euphorbia hirta*; (K) *Euphorbia hyssopifolia*; (L) *Euphorbia indivisa*; (M) *Euphorbia micromera*; (N) *Euphorbia pediculifera*; (O) *Euphorbia prostrata*; (P) *Euphorbia revoluta*; (Q) *Euphorbia serpillifolia*; (R) *Euphorbia setiloba*; (S & T) *Jatropha macrorhiza*.

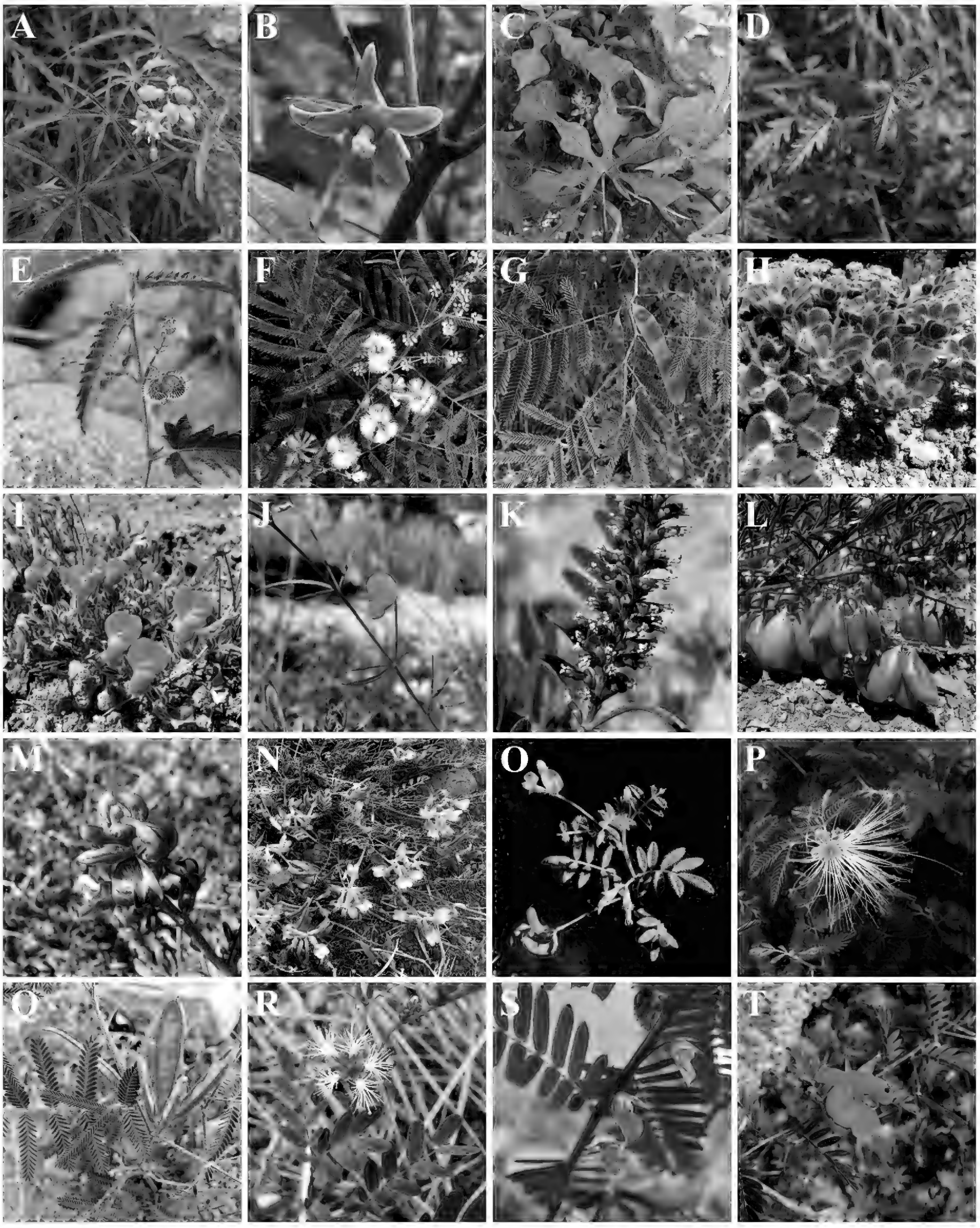

Figure 18. **EUDICOTS** cont. **Euphorbiaceae**: (A) *Manihot angustiloba*; (B & C) *Manihot davisiae*; (D) *Tragia laciniata*; (E) *Tragia nepetifolia*. **Fabaceae**: (F & G) *Acaciella angustissima*; (H) *Acmispon brachycarpus*; (I) *Acmispon greenei*; (J) *Acmispon oroboides*; (K) *Amorpha fruticosa*; (L) *Astragalus allochrous*; (M) *Astragalus arizonicus*; (N) *Astragalus nothoxys*; (O) *Astragalus nuttallianus*; (P) *Calliandra eriophylla*; (Q) *Calliandra humilis* var. *humilis*; (R) *Calliandra humilis* var. *reticulata*; (S) *Chamaecrista nictitans* var. *leptadenia*; (T) *Chamaecrista serpens* var. *wrightii*.

Figure 19. **EUDICOTS** cont. **Fabaceae**: (A) *Cologania angustifolia*; (B) *Coursetia caribaea* var. *sericea*; (C & D) *Crotalaria pumila*; (E) *Dalea albiflora*; (F) *Dalea exigua*; (G) *Dalea formosa*; (H) *Dalea grayi*; (I) *Dalea mollissima*; (J) *Dalea nana*; (K) *Dalea pogonathera*; (L) *Dalea pringlei*; (M) *Dalea pulchra*; (N) *Dalea versicolor* var. *sessilis*; (O) *Dalea wrightii*; (P) *Desmanthus cooleyi*; (Q) *Desmodium batocaulon*; (R) *Desmodium cinerascens*; (S & T) *Desmodium grahamii*.

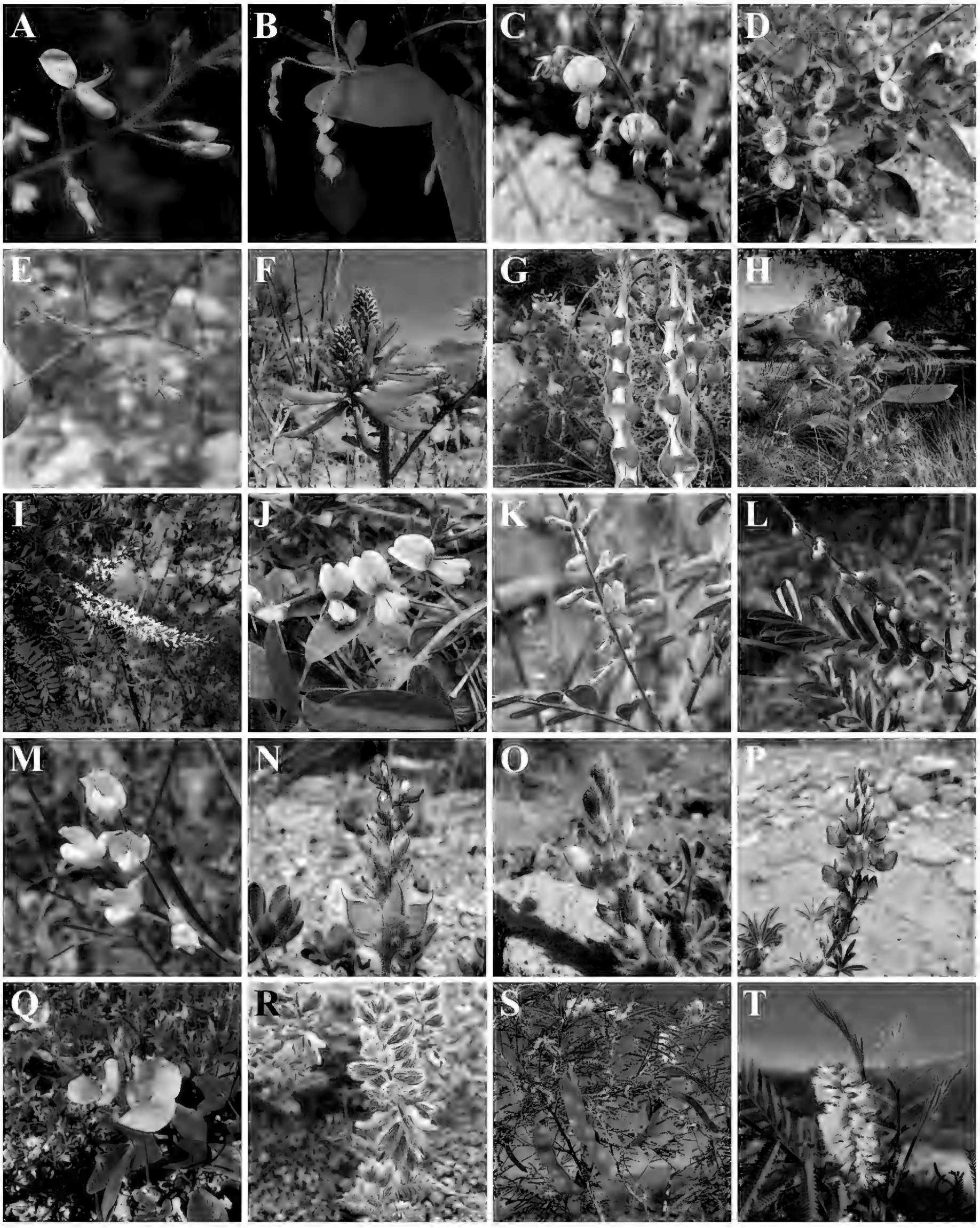

Figure 20. **EUDICOTS** cont. **Fabaceae**: (A & B) *Desmodium neomexicanum*; (C & D) *Desmodium psilocarpum*; (E) *Desmodium rosei*; (F & G) *Erythrina flabelliformis*; (H) *Erythrostemon gilliesii*; (I) *Eysenhardtia orthocarpa*; (J) *Galactia wrightii*; (K & L) *Indigofera sphaerocarpa*; (M) *Lathyrus graminifolius*; (N) *Lupinus brevicaulis*; (O) *Lupinus concinnus*; (P) *Lupinus sparsiflorus*; (Q) *Macroptilium gibbosifolium*; (R) *Marina calycosa*; (S & T) *Mariosousa millefolia*.

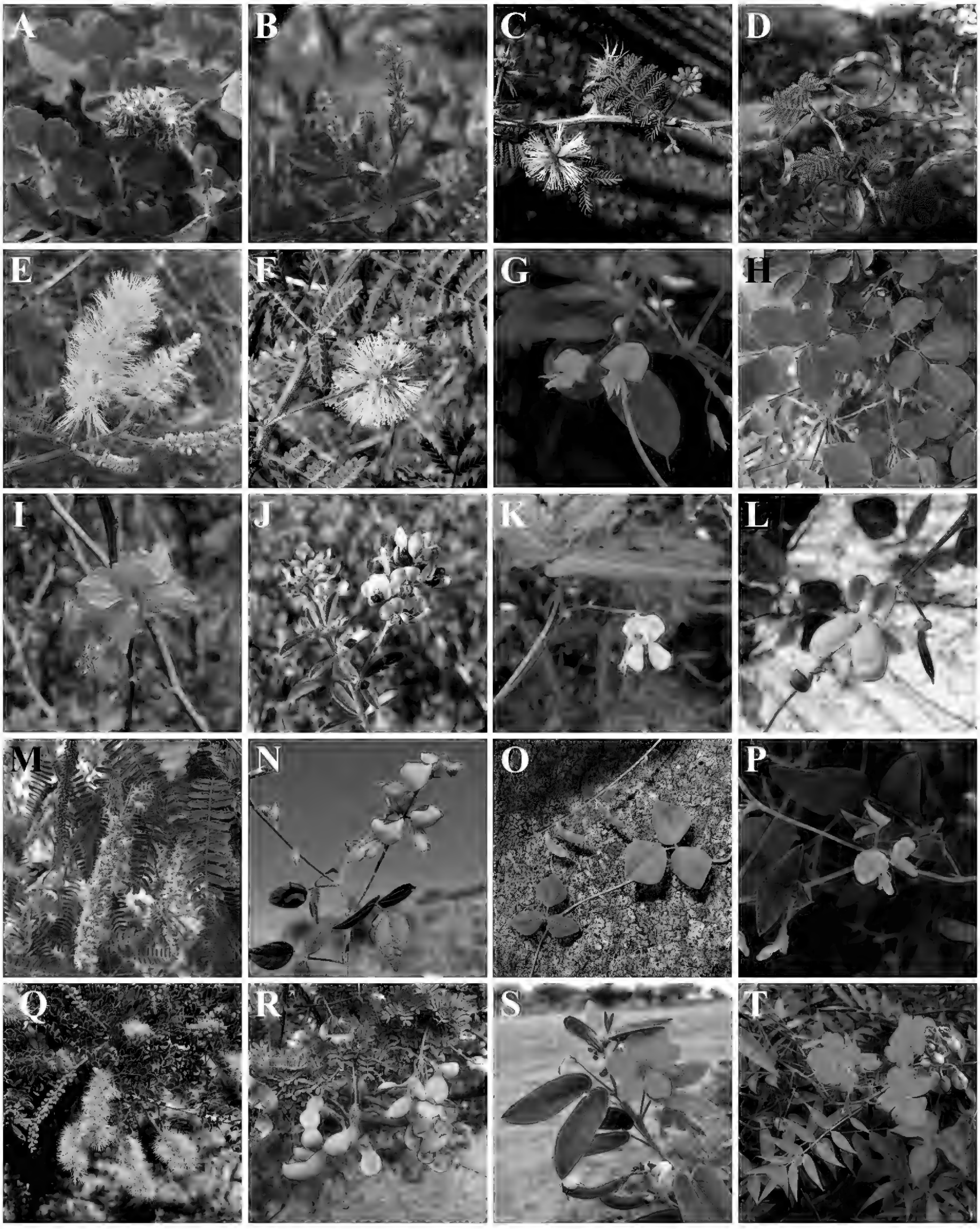

Figure 21. **EUDICOTS** cont. **Fabaceae**: (A) *Medicago polymorpha*; (B) *Melilotus indicus*; (C & D) *Mimosa aculeaticarpa* var. *biuncifera*; (E) *Mimosa dysocarpa*; (F) *Mimosa grahamii*; (G & H) *Nissolia schottii*; (I) *Parkinsonia florida*; (J) *Pediomelum tenuiflorum*; (K) *Phaseolus acutifolius*; (L) *Phaseolus ritensis*; (M) *Prosopis velutina*; (N) *Rhynchosia edulis*; (O) *Rhynchosia minima*; (P) *Rhynchosia senna* var. *texana*; (Q & R) *Senegalia greggii*; (S) *Senna bauhinioides*; (T) *Senna hirsuta* var. *glaberrima*.

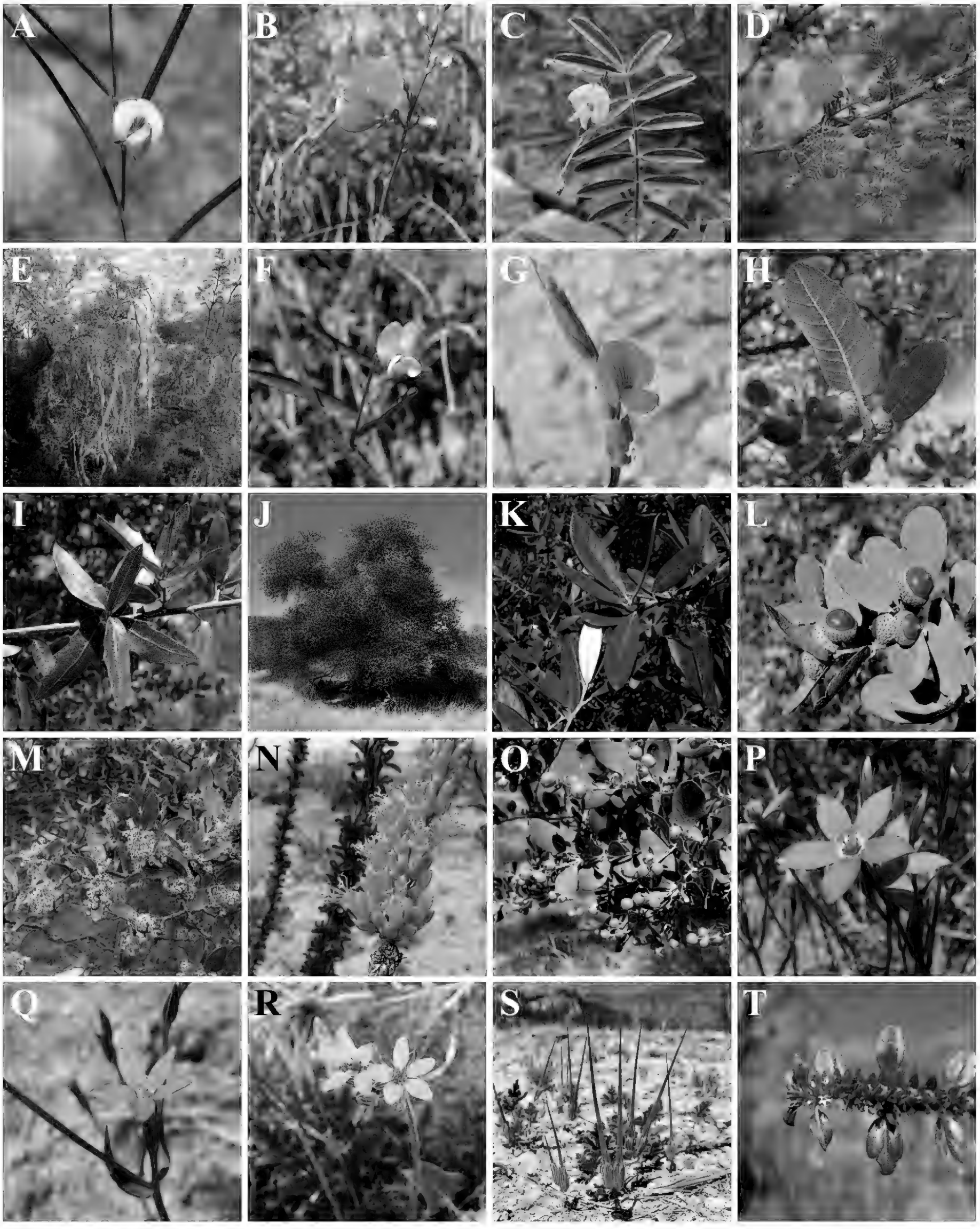

Figure 22. **EUDICOTS** cont. **Fabaceae**: (A) *Sphinctospermum constrictum*; (B) *Tephrosia leiocarpa*; (C) *Tephrosia tenella*; (D & E) *Vachellia constricta*; (F) *Vicia ludoviciana*; (G) *Zornia reticulata*. **Fagaceae**: (H) *Quercus arizonica*; (I & J) *Quercus emoryi*; (K) *Quercus hypoleucoides*; (L) *Quercus oblongifolia*; (M) *Quercus toumeyi*. **Fouquieriaceae**: (N) *Fouquieria splendens*. **Garryaceae**: (O) *Garrya wrightii*. **Gentianaceae**: (P) *Zeltnera arizonica*; (Q) *Zeltnera nudicaulis*. **Geraniaceae**: (R) *Erodium cicutarium*; (S) *Erodium texanum*. **Heliotropiaceae**: (T) *Euploca fruticosa*.

Figure 23. **EUDICOTS** cont. **Heliotropiaceae**: (A) *Euploca procumbens*. **Hydrangeaceae**: (B) *Fendlera rupicola*; (C) *Philadelphus microphyllus*. **Hydrophyllaceae**: (D) *Eucrypta micrantha*; (E) *Phacelia affinis*; (F) *Phacelia arizonica*; (G) *Phacelia bombycina*; (H) *Phacelia caerulea*; (I) *Phacelia distans*; (J) *Phacelia sonoitensis*. **Juglandaceae**: (K & L) *Juglans major*. **Krameriaceae**: (M & N) *Krameria erecta*; (O) *Krameria lanceolata*. **Lamiaceae**: (P) *Clerodendrum coulteri*; (Q) *Hedeoma dentata*; (R) *Lamium amplexicaule*; (S) *Marrubium vulgare*; (T) *Monarda citriodora* subsp. *austromontana*.

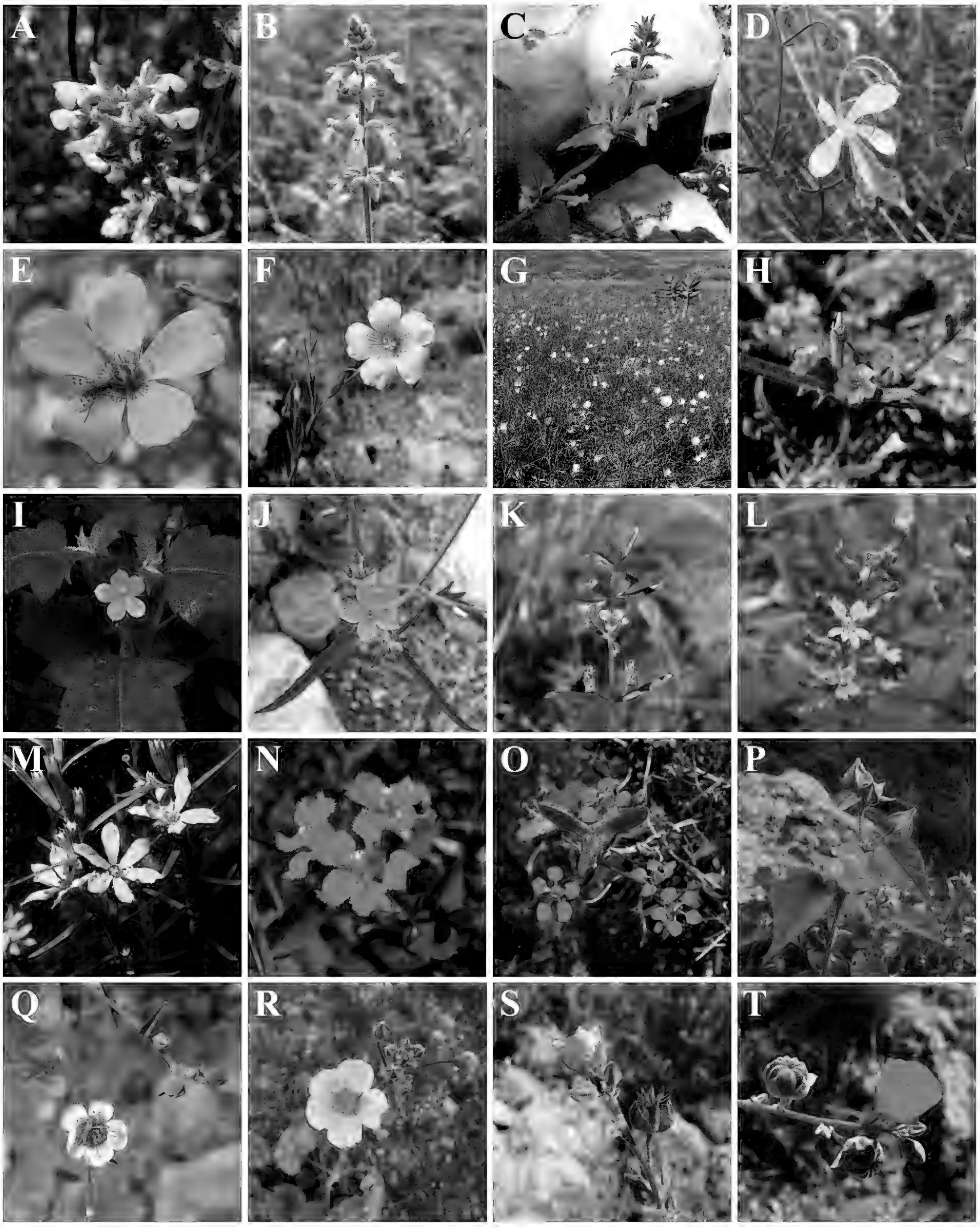

Figure 24. **EUDICOTS** cont. **Lamiaceae**: (A) *Salvia parryi*; (B) *Salvia subincisa*; (C) *Stachys coccinea*; (D) *Trichostema arizonicum*. **Linaceae**: (E) *Linum puberulum*; (F & G) *Linum usitatissimum*. **Loasaceae**: (H) *Mentzelia albicaulis*; (I) *Mentzelia aspera*; (J) *Mentzelia isolata*. **Lythraceae**: (K) *Ammannia auriculata*; (L) *Cuphea wrightii*; (M) *Lythrum californicum*. **Malpighiaceae**: (N) *Aspicarpa hirtella*; (O) *Cottsia gracilis*. **Malvaceae**: (P) *Abutilon abutiloides*; (Q) *Abutilon incanum*; (R) *Abutilon mollicomum*; (S) *Abutilon parishii*; (T) *Abutilon reventum*.

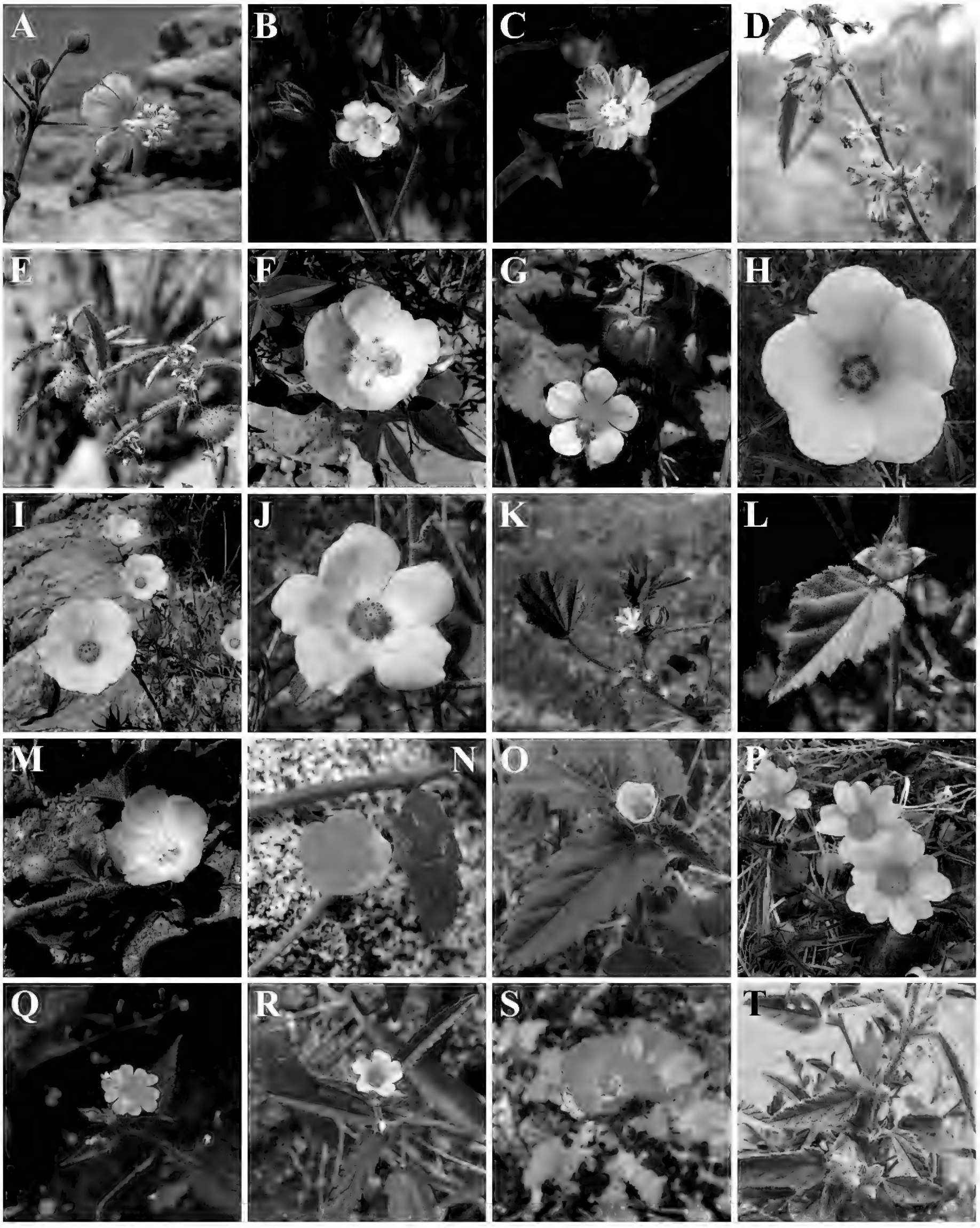

Figure 25. **EUDICOTS** cont. **Malvaceae**: (A) *Anoda abutiloides*; (B) *Anoda crenatiflora*; (C) *Anoda cristata*; (D & E) *Ayenia filiformis*; (F) *Gossypium thurberi*; (G) *Herissantia crispa*; (H) *Hibiscus biseptus*; (I) *Hibiscus coulteri*; (J) *Hibiscus denudatus*; (K) *Malva parviflora*; (L) *Malvastrum bicuspidatum*; (M) *Malvella leprosa*; (N) *Pseudabutilon thurberi*; (O) *Rhynchosida physocalyx*; (P) *Sida abutilifolia*; (Q) *Sida glabra*; (R) *Sida spinosa*; (S) *Sphaeralcea ambigua*; (T) *Sphaeralcea emoryi*.

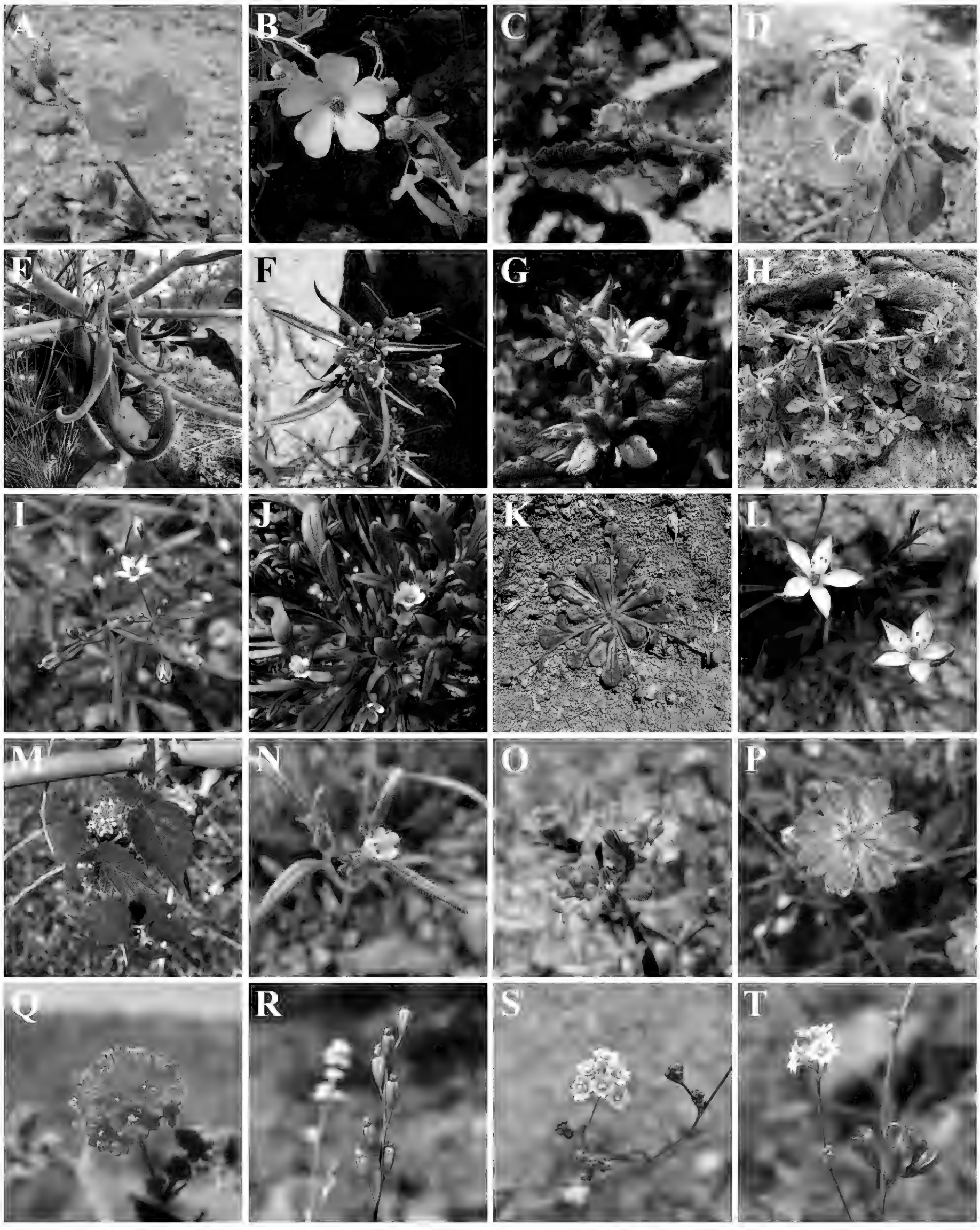

Figure 26. **EUDICOTS** cont. **Malvaceae**: (A) *Sphaeralcea hastulata*; (B) *Sphaeralcea laxa*; (C) *Waltheria indica*. **Martyniaceae**: (D & E) *Proboscidea parviflora*. **Menispermaceae**: (F) *Cocculus diversifolius*. **Molluginaceae**: (G & H) *Glinus radiatus*; (I) *Mollugo verticillata*. **Montiaceae**: (J) *Calandrinia ciliata*; (K) *Cistanthe monandra*; (L) *Phemeranthus parviflorus*. **Moraceae**: (M) *Morus microphylla*. **Namaceae**: (N) *Nama dichotoma*; (O) *Nama hispida*. **Nyctaginaceae**: (P) *Allionia incarnata*; (Q) *Boerhavia coccinea*; (R) *Boerhavia coulteri*; (S) *Boerhavia erecta*; (T) *Boerhavia megaptera*.

Figure 27. **EUDICOTS** cont. **Nyctaginaceae**: (A) *Boerhavia wrightii*; (B) *Commicarpus scandens*; (C) *Mirabilis albida*; (D) *Mirabilis linearis*; (E) *Mirabilis longiflora*; (F) *Mirabilis melanotricha*. **Oleaceae**: (G) *Fraxinus gooddingii*; (H & I) *Fraxinus velutina*. **Onagraceae**: (J) *Epilobium canum* var. *latifolium*; (K) *Eremothera chamaenerioides*; (L) *Eulobus californicus*; (M) *Oenothera caespitosa*; (N) *Oenothera curtiflora*; (O) *Oenothera platanorum*; (P) *Oenothera podocarpa*; (Q) *Oenothera primiveris*; (R) *Oenothera rosea*; (S) *Oenothera suffrutescens*. **Orobanchaceae**: (T) *Brachystigma wrightii*.

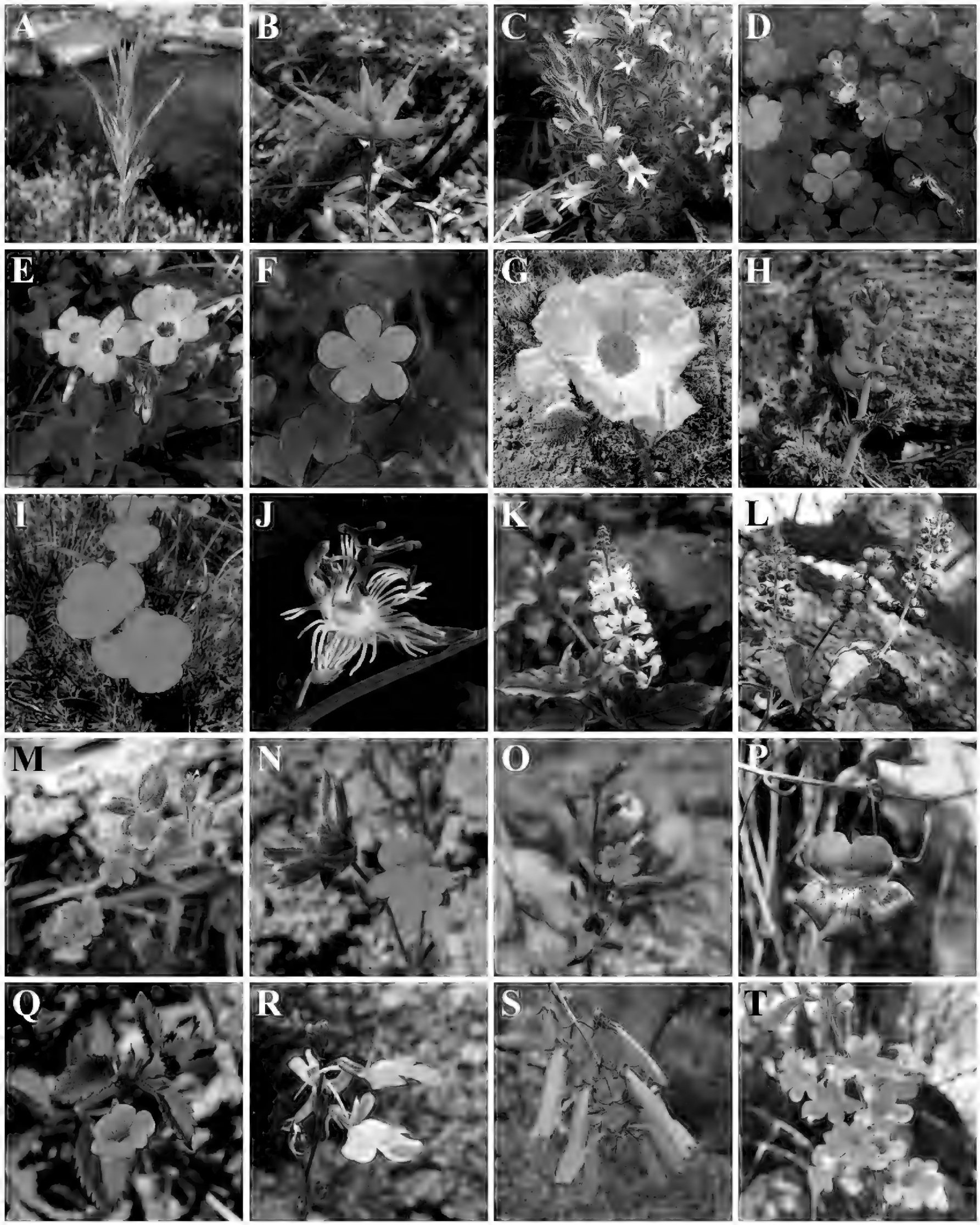

Figure 28. **EUDICOTS** cont. **Orobanchaceae**: (A) *Castilleja minor* var. *minor*; (B) *Castilleja tenuiflora*; (C) *Orobanche cooperi* subsp. *cooperi*. **Oxalidaceae**: (D) *Oxalis corniculata*; (E) *Oxalis latifolia*; (F) *Oxalis stricta*. **Papaveraceae**: (G) *Argemone pleiacantha*; (H) *Corydalis aurea* subsp. *occidentalis*; (I) *Eschscholzia californica* subsp. *mexicana*. **Passifloraceae**: (J) *Passiflora mexicana*. **Petiveriaceae**: (K & L) *Rivina humilis*. **Phrymaceae**: (M) *Erythranthe floribunda*; (N) *Erythranthe guttata*; (O) *Erythranthe rubella*. **Plantaginaceae**: (P) *Maurandella antirrhiniflora*; (Q) *Mecardonia procumbens*; (R) *Nuttallanthus texanus*; (S) *Penstemon barbatus*; (T) *Penstemon parryi*.

Figure 29. **EUDICOTS** cont. **Plantaginaceae**: (A) *Plantago patagonica*; (B) *Plantago virginica*; (C) *Sairocarpus nuttallianus*; (D) *Schistophragma intermedium*; (E) *Stemodia durantifolia*; (F) *Veronica anagallis-aquatica*; (G) *Veronica peregrina*. **Plumbaginaceae**: (H) *Plumbago zeylanica*. **Polemoniaceae**: (I) *Eriastrum diffusum*; (J) *Gilia flavocincta* subsp. *australis*; (K) *Gilia mexicana*; (L) *Ipomopsis thurberi*; (M) *Leptosiphon chrysanthus*; (N) *Linanthus bigelovii*; (O) *Loeselia glandulosa*; (P) *Phlox gracilis*. **Polygalaceae**: (Q) *Hebecarpa barbeyana*; (R) *Hebecarpa obscura*; (S) *Monnina wrightii*; (T) *Polygala alba*.

Figure 30. **EUDICOTS** cont. **Polygonaceae**: (A) *Eriogonum abertianum*; (B) *Eriogonum polycladon*; (C) *Eriogonum thurberi*; (D) *Eriogonum wrightii*; (E) *Persicaria pensylvanica*; (F) *Rumex crispus*. **Portulacaceae**: (G) *Portulaca oleracea*; (H) *Portulaca suffrutescens*; (I) *Portulaca umbraticola*. **Primulaceae**: (J) *Androsace occidentalis*. **Ranunculaceae**: (K) *Anemone tuberosa*; (L & M) *Clematis drummondii*; (N) *Delphinium scaposum*; (O) *Myosurus cupulatus*; (P) *Myosurus minimus*; (Q) *Thalictrum fendleri*. **Rhamnaceae**: (R) *Condalia correllii*; (S) *Sageretia wrightii*; (T) *Sarcomphalus obtusifolius*.

Figure 31. **EUDICOTS** cont. **Rosaceae**: (A) *Cercocarpus breviflorus*. **Rubiaceae**: (B) *Bouvardia ternifolia*; (C) *Diodia teres*; (D) *Galium aparine*; (E) *Galium microphyllum*; (F) *Galium proliferum*; (G) *Galium wrightii*; (H & I) *Hedyotis vegrandis*; (J) *Mitracarpus hirtus*; (K) *Stenotis greenei*. **Rutaceae**: (L) *Ptelea trifoliata*. **Salicaceae**: (M) *Populus fremontii*; (N) *Salix bonplandiana*; (O) *Salix exigua*; (P) *Salix gooddingii*; (Q) *Salix taxifolia*. **Sapindaceae**: (R) *Dodonaea viscosa*; (S & T) *Sapindus saponaria*.

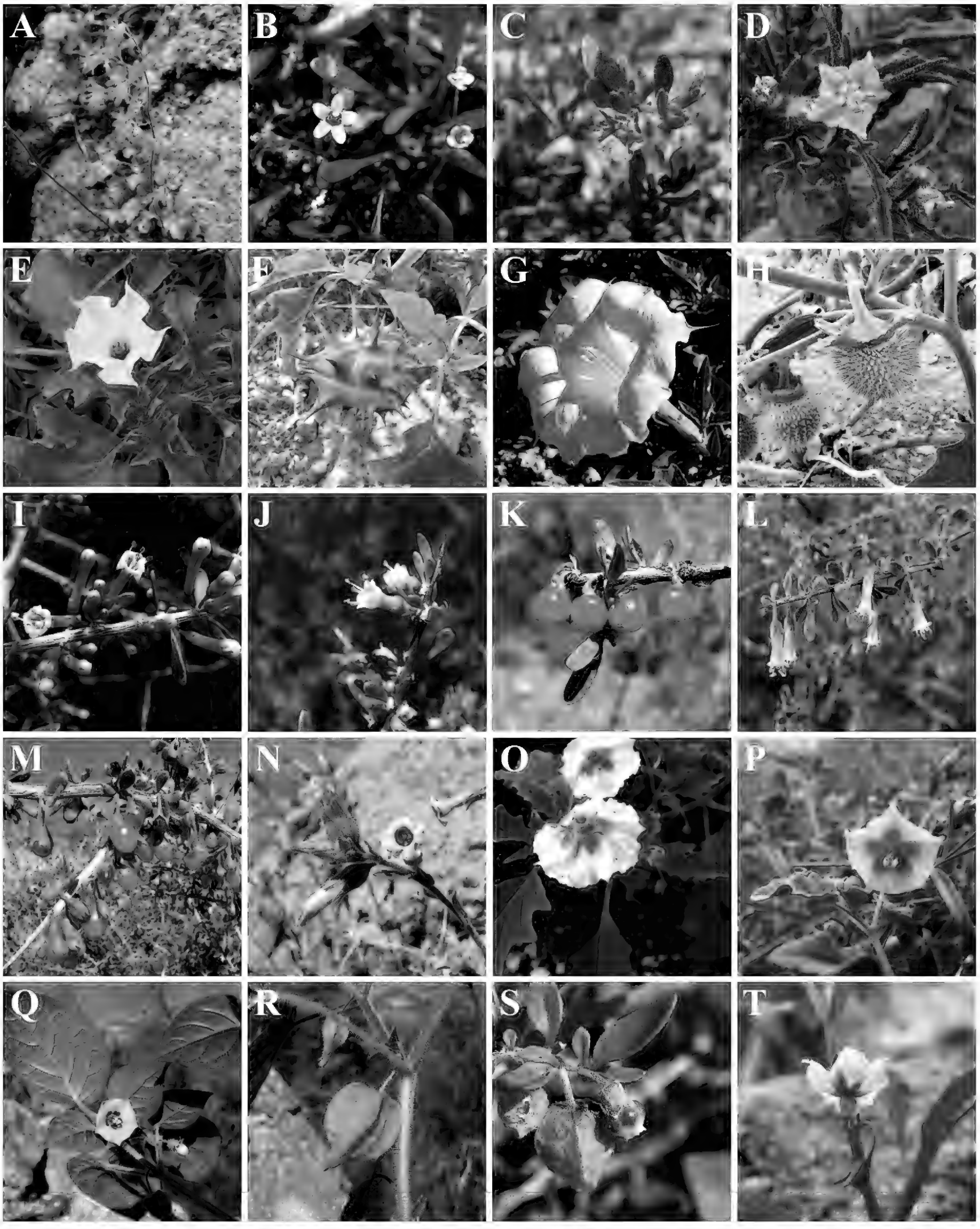

Figure 32. **EUDICOTS** cont. **Saxifragaceae**: (A) *Heuchera sanguinea*. **Scrophulariaceae**: (B) *Limosella acaulis*. **Solanaceae**: (C) *Calibrachoa parviflora*; (D) *Chamaesaracha coronopus*; (E & F) *Datura quercifolia*; (G & H) *Datura wrightii*; (I) *Lycium andersonii*; (J & K) *Lycium berlandieri*; (L & M) *Lycium exsertum*; (N) *Nicotiana obtusifolia*; (O) *Physalis acutifolia*; (P) *Physalis hederifolia*; (Q & R) *Physalis pubescens*; (S) *Physalis solanacea*; (T) *Solanum adscendens*.

Figure 33. **EUDICOTS** cont. **Solanaceae**: (A) *Solanum adscendens*; (B) *Solanum elaeagnifolium*; (C & D) *Solanum houstonii*; (E) *Solanum lumholtzianum*; (F) *Solanum nigrescens*. **Talinaceae**: (G) *Talinum aurantiacum*; (H) *Talinum paniculatum*. **Tamaricaceae**: (I) *Tamarix chinensis*. **Urticaceae**: (J) *Parietaria pensylvanica*. **Verbenaceae**: (K) *Aloysia wrightii*; (L) *Bouchea prismatica*; (M) *Glandularia gooddingii*; (N) *Glandularia latilobata*; (O) *Phyla nodiflora*; (P) *Verbena bracteata*; (Q) *Verbena gracilis*; (R) *Verbena xylopoda*. **Viburnaceae**: (S) *Sambucus cerulea*. **Violaceae**: (T) *Hybanthus verticillatus*.

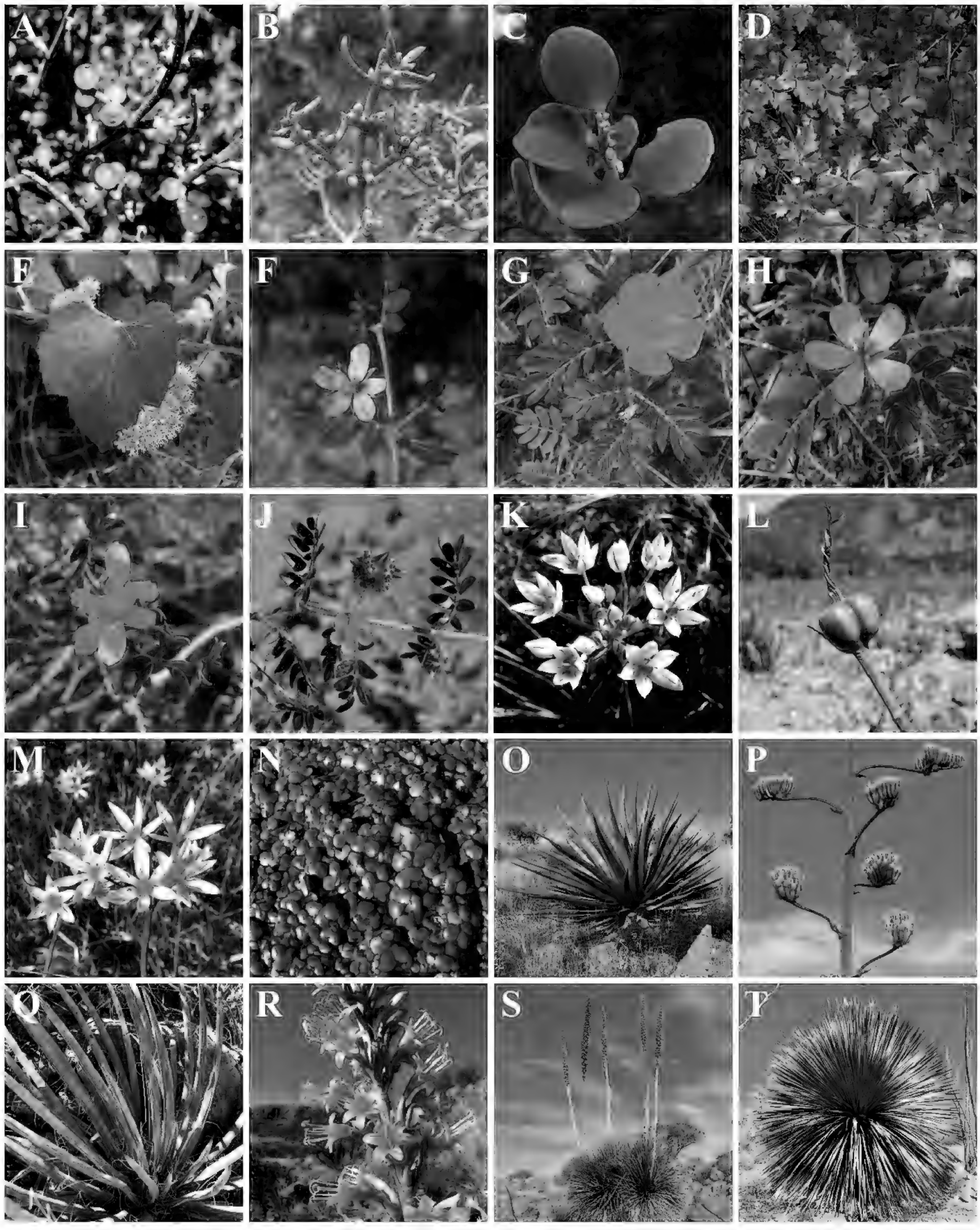

Figure 34. **EUDICOTS** cont. **Viscaceae**: (A) *Phoradendron californicum*; (B) *Phoradendron capitellatum*; (C) *Phoradendron leucarpum*. **Vitaceae**: (D) *Cissus trifoliata*; (E) *Vitis arizonica*. **Zygophyllaceae**: (F) *Kallstroemia californica*; (G) *Kallstroemia grandiflora*; (H) *Kallstroemia parviflora*; (I) *Larrea tridentata*; (J) *Tribulus terrestris*. **MONOCOTS**. **Amaryllidaceae**: (K) *Allium rhizomatum*; (L) *Habranthus longifolius*; (M) *Nothoscordum bivalve*. **Araceae**: (N) *Lemna gibba*. **Asparagaceae**: (O & P) *Agave palmeri*; (Q & R) *Agave schottii* var. *schottii*; (S & T) *Dasylirion wheeleri*.

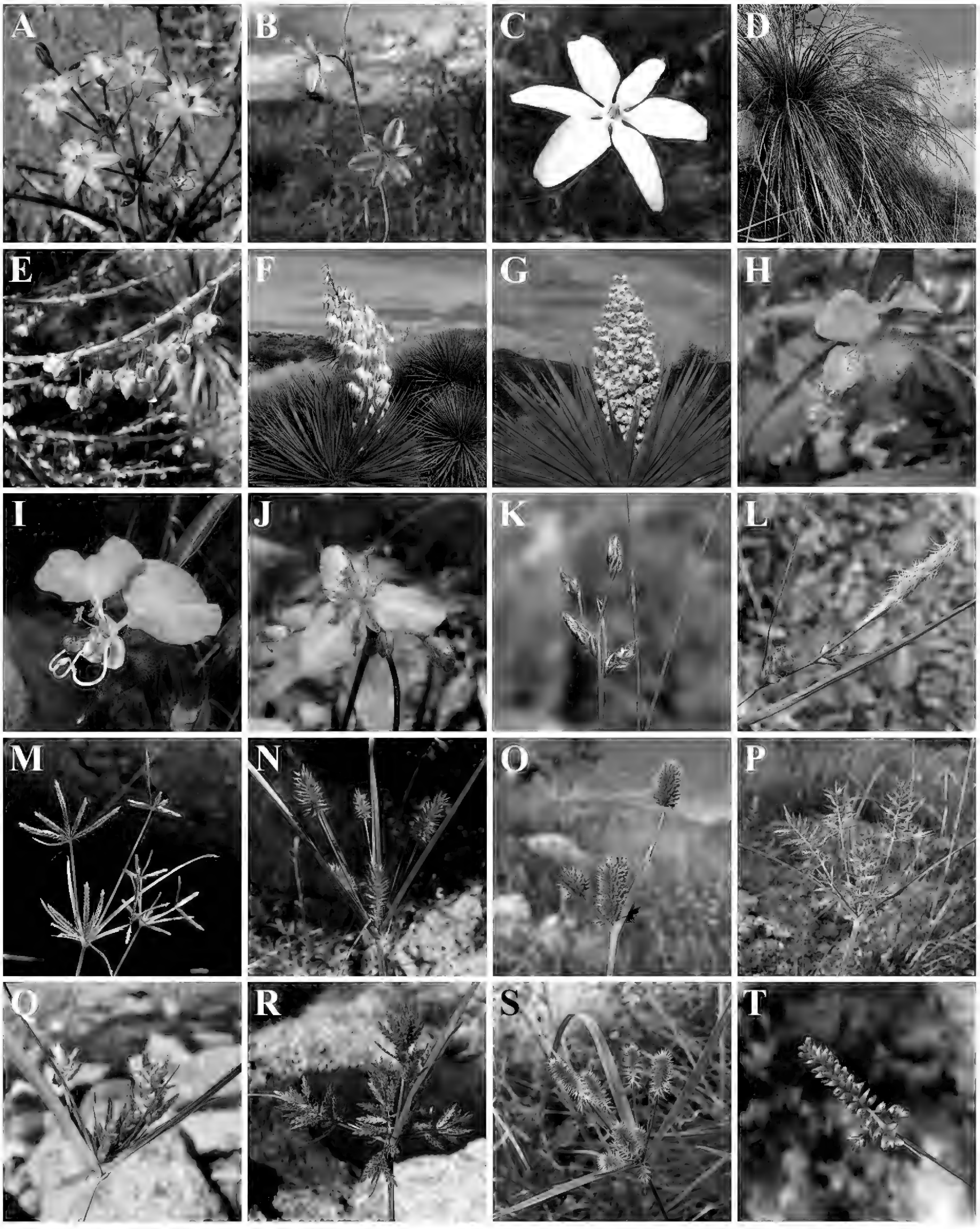

Figure 35. **MONOCOTS** cont. **Asparagaceae**: (A) *Dipterostemon capitatus* subsp. *pauciflorus*; (B) *Echeandia flavescens*; (C) *Milla biflora*; (D & E) *Nolina microcarpa*; (F) *Yucca baccata* var. *brevifolia*; (G) *Yucca* cf. *schottii*. **Commelinaceae**: (H) *Commelina dianthifolia*; (I) *Commelina erecta*; (J) *Tradescantia pinetorum*. **Cyperaceae**: (K) *Bulbostylis capillaris*; (L) *Carex leucodonta*; (M) *Cyperus amabilis*; (N) *Cyperus dentoniae*; (O) *Cyperus dipsaceus*; (P) *Cyperus esculentus*; (Q) *Cyperus fendlerianus*; (R) *Cyperus flavicomus*; (S) *Cyperus hermaphroditus*; (T) *Cyperus mutisii*.

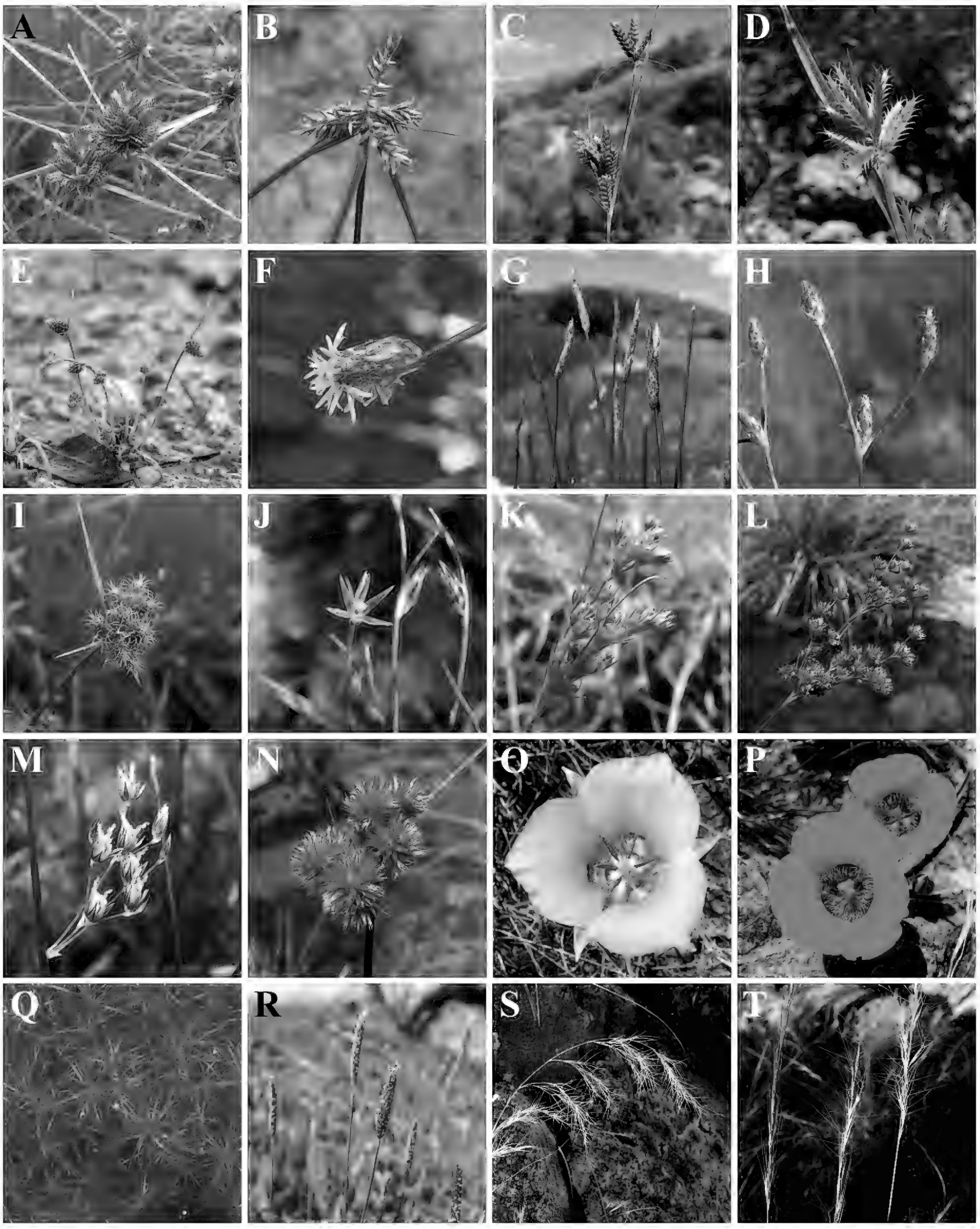

Figure 36. **MONOCOTS** cont. **Cyperaceae**: (A) *Cyperus niger*; (B) *Cyperus pallidicolor*; (C) *Cyperus sphaerolepis*; (D) *Cyperus squarrosus*; (E) *Cyperus subsquarrosus*; (F) *Eleocharis montevidensis*; (G) *Eleocharis palustris*; (H) *Fimbristylis annua*; (I) *Fuirena simplex* var. *aristulata*. **Juncaceae**: (J) *Juncus bufonius*; (K) *Juncus interior*; (L) *Juncus marginatus*; (M) *Juncus mexicanus*; (N) *Juncus torreyi*. **Liliaceae**: (O) *Calochortus ambiguus*; (P) *Calochortus kennedyi*. **Najadaceae**: (Q) *Najas guadalupensis*. **Poaceae**: (R) *Alopecurus carolinianus*; (S) *Aristida adscensionis*; (T) *Aristida purpurea* var. *nealleyi*.

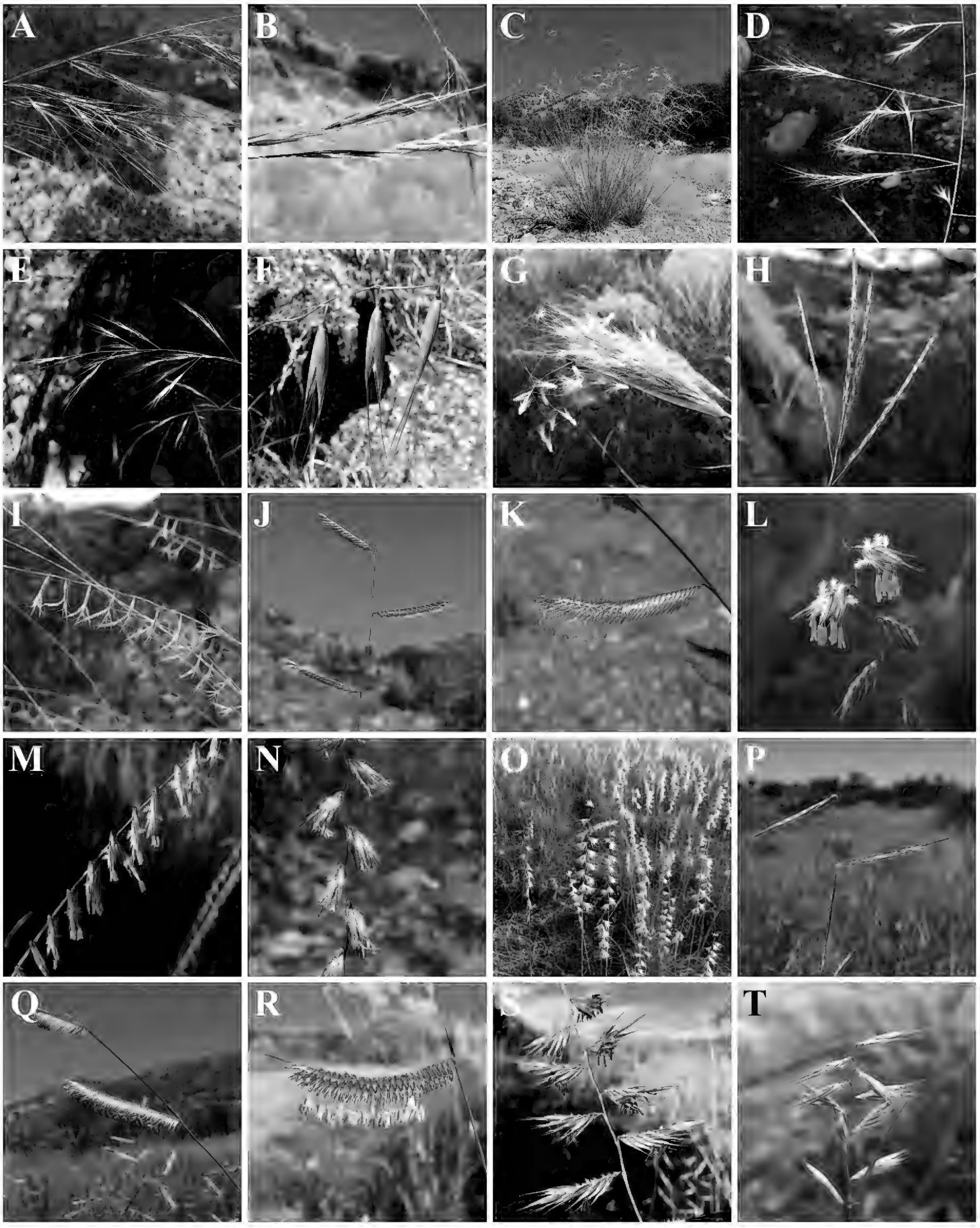

Figure 37. **MONOCOTS** cont. **Poaceae**: (A) *Aristida purpurea* var. *purpurea*; (B & C) *Aristida schiedeana* var. *orcuttiana*; (D) *Aristida ternipes* var. *gentilis*; (E) *Aristida ternipes* var. *ternipes*; (F) *Avena fatua*; (G) *Bothriochloa barbinodis*; (H) *Bothriochloa ischaemum*; (I) *Bouteloua aristidoides*; (J) *Bouteloua barbata* var. *barbata*; (K) *Bouteloua barbata* var. *rothrockii*; (L) *Bouteloua chondrosioides*; (M) *Bouteloua curtipendula*; (N & O) *Bouteloua eludens*; (P) *Bouteloua eriopoda*; (Q) *Bouteloua gracilis*; (R) *Bouteloua hirsuta*; (S) *Bouteloua radicosa*; (T) *Bouteloua repens*.

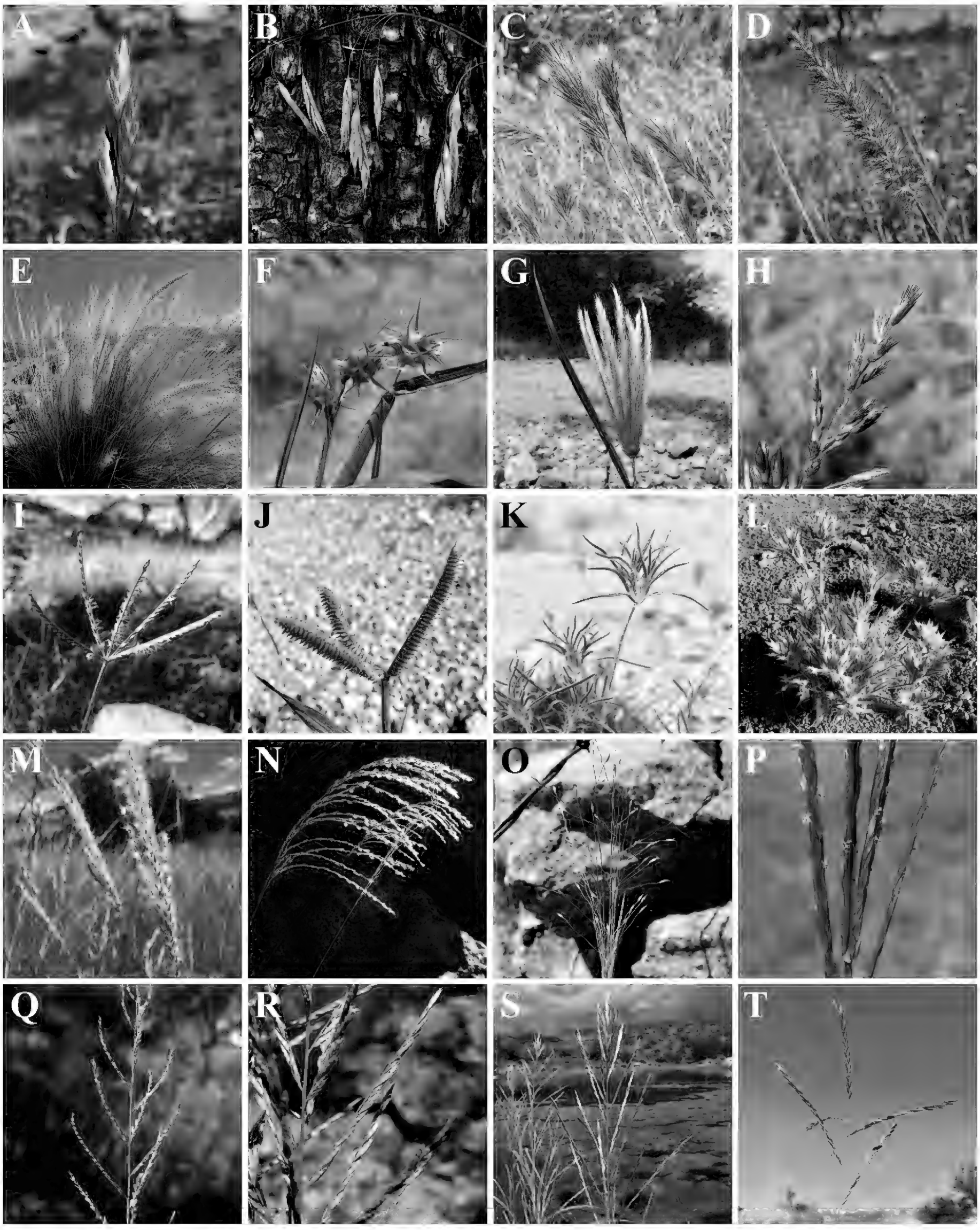

Figure 38. **MONOCOTS** cont. **Poaceae**: (A) *Bromus catharticus*; (B) *Bromus frondosus*; (C) *Bromus rubens*; (D) *Cenchrus ciliaris*; (E) *Cenchrus setaceus*; (F) *Cenchrus spinifex*; (G) *Chloris virgata*; (H) *Cottea pappophoroides*; (I) *Cynodon dactylon*; (J) *Dactyloctenium aegyptium*; (K & L) *Dasyochloa pulchella*; (M) *Digitaria californica*; (N) *Digitaria insularis*; (O) *Digitaria pubiflora*; (P) *Digitaria sanguinalis*; (Q) *Dinebra panicea*; (R) *Dinebra viscida*; (S) *Diplachne fusca* subsp. *fascicularis*; (T) *Disakisperma dubium*.

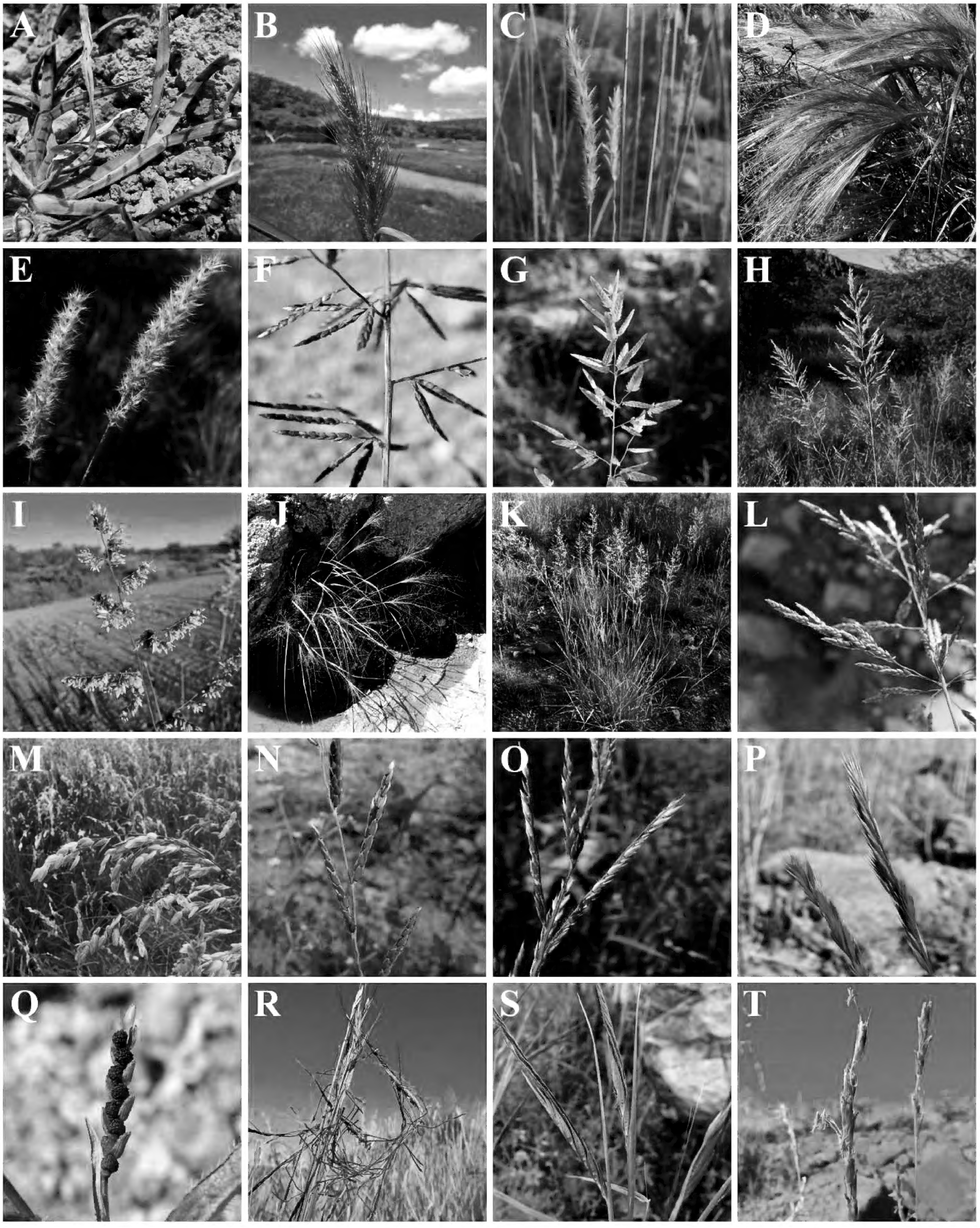

Figure 39. **MONOCOTS** cont. **Poaceae**: (A) *Echinochloa colona*; (B) *Echinochloa crus-galli*; (C) *Elionurus barbiculmis*; (D) *Elymus elymoides*; (E) *Enneapogon desvauxii*; (F) *Eragrostis barrelieri*; (G) *Eragrostis cilianensis*; (H) *Eragrostis curvula*; (I) *Eragrostis echinochloidea*; (J) *Eragrostis intermedia*; (K) *Eragrostis lehmanniana*; (L) *Eragrostis pectinacea*; (M) *Eragrostis superba*; (N) *Eriochloa acuminata*; (O) *Eriochloa aristata*; (P) *Festuca octoflora*; (Q) *Hackelochloa granularis*; (R) *Heteropogon contortus*; (S) *Heteropogon melanocarpus*; (T) *Hilaria belangeri*.

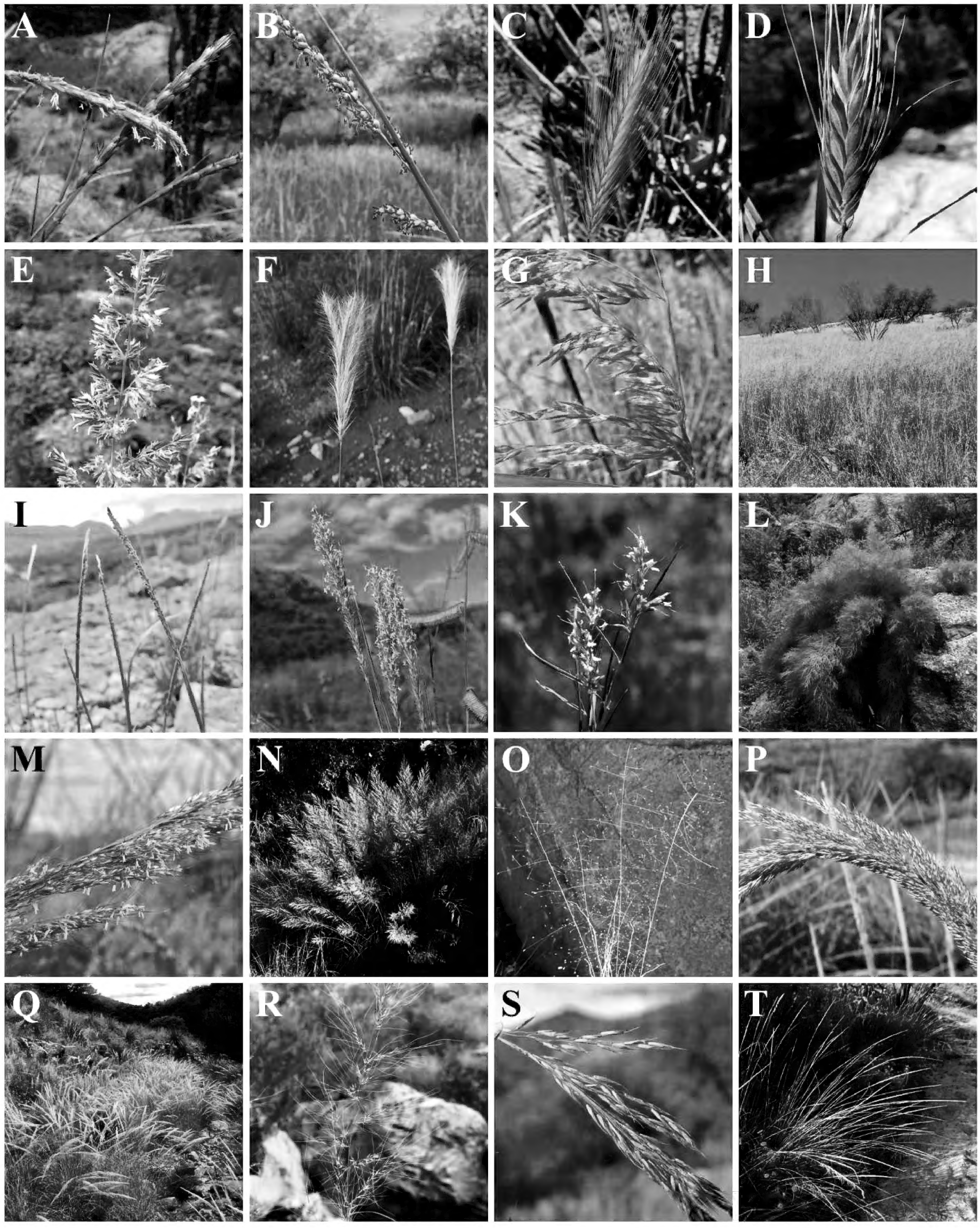

Figure 40. **MONOCOTS** cont. **Poaceae**: (A) *Hilaria mutica*; (B) *Hopia obtusa*; (C) *Hordeum murinum*; (D) *Hordeum vulgare*; (E) *Koeleria pyramidata* var. *pyramidata*; (F) *Leptochloa crinita*; (G & H) *Melinis repens*; (I) *Microchloa kunthii*; (J) *Muhlenbergia alopecuroides*; (K & L) *Muhlenbergia dumosa*; (M & N) *Muhlenbergia emersleyi*; (O) *Muhlenbergia fragilis*; (P & Q) *Muhlenbergia longiligula*; (R) *Muhlenbergia microsperma*; (S & T) *Muhlenbergia palmeri*.

Figure 41. **MONOCOTS** cont. **Poaceae**: (A) *Muhlenbergia repens*; (B & C) *Muhlenbergia rigens*; (D) *Muhlenbergia rigida*; (E & F) *Muhlenbergia sinuosa*; (G) *Muhlenbergia tenuifolia*; (H) *Muhlenbergia texana*; (I) *Muhlenbergia uniseta*; (J) *Panicum antidotale*; (K) *Panicum coloratum*; (L) *Panicum hallii*; (M) *Panicum hirticaule*; (N) *Pappophorum vaginatum*; (O) *Paspalum distichum*; (P) *Phalaris minor*; (Q) *Piptochaetium fimbriatum*; (R) *Poa annua*; (S) *Poa bigelovii*; (T) *Poa fendleriana*.

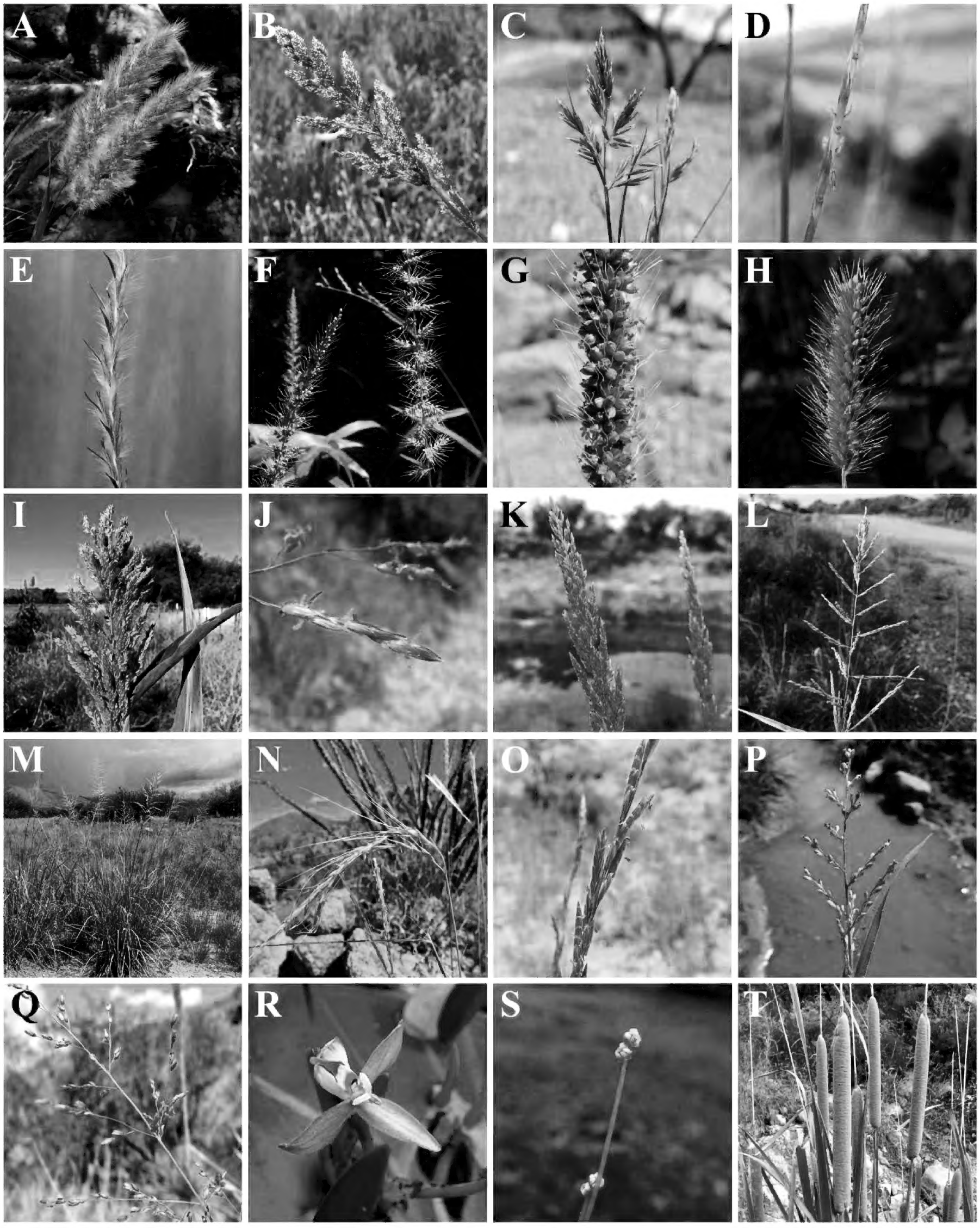

Figure 42. **MONOCOTS** cont. **Poaceae**: (A) *Polypogon monspeliensis*; (B) *Polypogon viridis*; (C) *Schismus barbatus*; (D) *Schizachyrium cirratum*; (E) *Schizachyrium sanguineum*; (F) *Setaria grisebachii*; (G) *Setaria macrostachya*; (H) *Setaria viridis*; (I) *Sorghum bicolor*; (J) *Sorghum halepense*; (K) *Sphenopholis obtusata*; (L) *Sporobolus cryptandrus*; (M) *Sporobolus wrightii*; (N) *Trachypogon spicatus*; (O) *Tridens muticus*; (P) *Urochloa arizonica*; (Q) *Zuloagaea bulbosa*. **Pontederiaceae**: (R) *Heteranthera limosa*. **Potamogetonaceae**: (S) *Potamogeton pusillus*. **Typhaceae**: (T) *Typha domingensis*.